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NEW LAKE SHIPS—HIGH VALUES.

The order for two steel freight steamers, placed a few days ago by Eddy Bros. of Bay City, Mich., with the Detroit Ship Building Co., is not the most important item in negotiations for new vessels now under way with the American Ship Building Co., which controls the Detroit works and other ship yards on the lakes. The Union Dry Dock Co. at Buffalo and the Craig company at Toledo, which are independent of the consolidation, are also figuring on several prospective orders, and it is more than probable that before another month has passed every yard on the great lakes, including the Wheeler plant at West Bay City, will have new work running well into the close of next season. One of the Eddy boats is to be finished in June next and the other in August. One of them will probably be built at West Bay City. They are to be duplicates and entirely similar to the Presque Isle recently built at the Detroit works. They are to be of the 6,000-ton (gross) type. Dimensions and other particulars are: Keel, 414 feet; beam, 50 feet; depth, 28 feet; engines, triple expansion with cylinders of 22, 35 and 58 inches diameter and 42 inches stroke; two boilers, fitted with Howden hot draft, and each 13 feet 2 inches diameter and 12 feet long. No matter where the hulls of these vessels are built, it is more than probable that the Detroit works will furnish all plans and will build the engines and boilers.

Such of the steel vessels on the lakes as are not already controlled by the big iron consolidations are held at prices that prevent further important transfers. It is a fact that the Carnegie Steel Co.'s representatives have been making some inquiries regarding the purchase of ore carriers of modern kind, but not in a very definite way, and it would now seem that if they are to follow their manufacturing competitors, in providing for the transportation of a large tonnage in ore that is not tied up by contract with the Rockefeller interest, they must devise some plan of providing material for the construction of the ships and must enter into such an undertaking on a big scale.

Values in the Inland Lloyds Register, prepared for insurance purposes, do not, of course, represent the full value of new ships under present conditions, but they are high enough to show the upward tendency that now prevails in vessel property of all kinds. The latest supplement to the register contains the following valuations: Steamer Malietoa, recently completed at Lorain for Minnesota Steamship Co., 5,229 gross tons and \$275,000; steamer Mauna Loa, recently completed at South Chicago for the same company, 4,951 gross tons and \$265,000; steamer H. C. Frick, recently completed at Cleveland for John Mitchell and others of Cleveland, 4,783 gross tons and \$260,000. These figures are in each case full \$50,000 below the price at which the vessel could be bought.

The register gives the passenger steamer Illinois of Chicago a value of \$240,000, and the package freighter Buffalo of the Illinois Central line a value of \$245,000.

BATH SHIP BUILDING.

At the yard of the Hon. Wm. Rogers at the North end, the new four-masted schooner is all ceiled up and the deck beams are in place. There is some delay in the work on account of the difficulty in obtaining hard pine plank.

At the yard of Kelley, Spear & Co., the barge Edith for the Commercial Towboat Co. of Boston, is all timbered out. The tug boat for the Staples Coal Co. of Taunton, Mass., is all planked and ready for caulking. Her machinery is being made by the Portland company of Portland, Me. The large 3,000-ton barge for New York parties is half in frame, and barge No. 20 for the Consolidation Coal Co. is being pushed rapidly along. Planking was commenced on her this week.

At the yard of the New England Co. the B line barge Basyn will be ready to launch in about a week. This craft has been built on the ways with the stem nearest the water—a novel sight for Maine ship builders. The large five-masted schooner is advancing well. She is four-fifths ceiled and planking has commenced. The 1,800-ton barge for the Coastwise Steamship Co. is half timbered out and the keel is laid for another similar craft for the same company.

The Bath Iron Works is as busy as ever. Last Monday the torpedo boat T. A. M. Craven was successfully launched and the Tuesday preceding the above date saw the handsome steam yacht Virginia make her maiden plunge into her natural element. The Dahlgren will probably have her official trial trip early in November and the Craven will probably follow. Frames are being bent for the torpedo boats Bagley, Barney and Biddle and the machinery of these boats is well advanced. The monitor Connecticut is over 25 per cent. completed. Work has commenced on the upper works and she could be launched in eight months if the builders so desired. The tow boats for the N. Y., N. H. & H. R. R. have been held back on account of the non-delivery of steel. The frames for these boats are now being bent and the bar keels are laid both on the same slip, one forward of the other.

The Bath Iron Works are constantly enlarging their plant and they have now the fourth largest ship and engine building plant in the country. It is a compact, well-arranged, substantial and modern plant. Edward W. Hyde, the talented son of Gen. T. W. Hyde, is the new president of the company, the popular general having resigned on account of ill health. John L. Hyde, the general's oldest son, is the new vice-president, and he still retains his old position of superintendent of the engine department. Hubert H. MacCarty is treasurer and Charles R. Hanscom general superintendent. The Hyde boys have had the reins of the company for the past two or three years and the plant has grown and prospered during this period.

SHIPPING MEN HONOR DEWEY.

Admiral Dewey has officially received the great album of newspaper clippings presented to him by the shipping interests of New York City. The album is three feet wide, a few inches longer, a foot thick and weighs 350 pounds. It is bound in seal leather and the corners are protected by heavy silver plates. The upper corner has a relief picture of the battle of Manila Bay. The lower corner has a picture of the Olympia steaming through the Narrows into the upper bay of this harbor, with the forts saluting the Admiral's flag. A large plate in the center of the cover bears the inscription "Admiral George Dewey, U. S. N., May 1, 1898—Sept. 28, 1899." The title page of the book is an engrossed dedication that reads as follows: "Presented to Admiral George Dewey by the representatives of the shipping interests of the port of New York as a token of their personal regard and a slight appreciation of the great service rendered our common country, not only in the glorious action of May, 1898, in Manila bay, but by his wise and prudent administration of affairs during most trying circumstances preceding the surrender of the city of Manila, Aug. 13, 1898."

The letter which accompanied the volume from the committee, of which T. B. Dalzell is chairman, is as follows:

"Admiral George Dewey, United States Navy:

"Dear Sir—The committee, representing the shipping interests of the port of New York, being anxious to fittingly commemorate both your distinguished services and your most welcome home-coming, devised and had executed the accompanying testimonials, of which we pray your acceptance. As you see, it is a record of your brilliant and heroic deeds as reported in the public press, with such embellishments as seem to us appropriate. Although containing many thousands of tributes, it but feebly expresses the universal acclaim which your career has excited throughout the length and breadth of your native land. Large as this volume is, it would require many times its present size to contain all the friendly expressions your patriotic deeds have called forth. We offer it with feelings of the warmest respect and affection and trust you will preserve and hand it down to your descendants, that they may have some faint idea what manner of man their ancestor was in the opinion of his fellow citizens.

With sincere respect, your obedient servants,

C. J. MAR, Secretary,

F. B. DALZELL, Treasurer."

OCTOBER STORMS ON THE LAKES.

The forecast just issued by the weather bureau for the current month is as follows:

"There is an increase both in the number and violence of lake storms in October, as compared with September. The squall winds and thunderstorms of the warm season gradually cease, being replaced by a different class of storms, some of which sweep over large areas and develop very great violence. October storms are generally preceded in the lake region by higher temperature, increasing cloudiness, and moderately high winds from some easterly or southerly quarter, which blow steadily as compared with the squall winds of summer.

"The greater number of October storms pass over the northern or Superior route. The number that move northeasterly from the central valleys, however, is greater than during the preceding month and storms from this quarter are more apt to be accompanied by high winds and gales than those which pass over the Superior route.

"Notice of the approach and force of storms is given by the system of signals described and illustrated elsewhere on the chart. In addition to the display of signal flags a telegram is sent daily to each displayman, advising him of the weather conditions, and in case of threatening weather, of the location and expected movement of the storm center.

"Masters of vessels flying the American flag, when in port where there is no weather bureau office or display station, can obtain information of the expected weather conditions by telegraphing to the weather bureau office in Chicago or Buffalo."

CAPT. WATKINS' DEFENSE.

Capt. Frederick Watkins, lately in command of the American liner Paris, has arrived in New York to endeavor to have the decision suspending his license for two years reconsidered. He is quoted as saying in an interview: "The Paris went on the rocks through a mistake of mine. When we left Cherbourg one of the officers entered in the book that the Paris passed La Hague at 6:35. Another officer, when we passed the Caskets, wrote in the book opposite the name 7:35. This last entry was made in full, distinct hand, and the preceding entry was faint. When I picked up the record to make the calculation, with pencil in hand, the light was rather dim, and I read the more conspicuous record and made the calculation from that. That threw me 17 miles off my course. I calculated to pass 2 miles off the Lizard. When I got inshore the current was running strong, and then it was no use. I had been in the habit of submitting my calculation in thick weather to my chief officer, he having no watches to look after; but it was not thick when we passed the Caskets."

Work on the new plant of the New York Ship Building Co. at Camden, N. J., goes on without interruption. Fifty-four pieces of foundation masonry have been laid and work on the steel structures is also well under way. One portion of the main building is under roof and three lines of track connecting with the Atlantic City railroad have been run into the grounds. A large force of men with pile drivers are also busy in the river on wharf construction and in laying foundations for the ways.

THE UNITED STATES COAST AND GEODETIC SURVEY.

BY HERBERT C. GRAVES,

ENGAGED IN THE SERVICE.

About the year 1800 the only charts of the coasts and harbors of the United States were those prepared during the latter half of the preceding century under the direction of the British admiralty. These were in the nature of a preliminary reconnaissance, and were inadequate to the demands of the increasing commerce of the nation. The demand for a thorough survey was felt very early, and its importance was urged by Thomas Jefferson. On his recommendation while President of the United States, congress in 1807 passed an act authorizing him to inaugurate such a survey, and declaring that it should include a designation of the islands and shoals, with the roads or places of anchorage, within 20 leagues of any part of the shores of the United States, together with such other matters as he might deem proper for completing an accurate chart of every part of the coasts; it also authorized the survey of St. George's bank, and any other bank or shoal and the soundings and currents beyond the distance aforesaid to the Gulf Stream.

In reply to a circular issued by Albert Gallatin, secretary of the treasury department, inviting an expression of opinion of scientific men as to the best method of conducting the proposed survey, F. R. Hassler submitted a plan for a trigonometric survey, as a base for the coast surveys in different localities and ultimately the entire coast, and to him was assigned the duty of organizing the Coast Survey. The work was much delayed; the instruments had to be obtained in Europe and to be specially constructed; the war with Great Britain in 1812 entirely arrested it; and it was only in 1817 that sufficient progress had been made to justify a commencement in the important harbor of New York, to be suspended almost immediately by the failure of congress to provide the necessary funds for its support.

In 1832 congress, urged by the secretary of the navy and others, revived the act of 1807 and made an appropriation for carrying on the work, and authorizing the employment of officers of the army and navy and such astronomers and persons as might be deemed necessary. This is the beginning of the continuous operations of the Coast Survey. Mr. Hassler was again placed in charge, and he continued to direct the work until his death in 1843. During his superintendency a base line was measured in the vicinity of New York; the triangulation was extended thence eastward as far as Rhode Island and south to the head of Chesapeake bay; many charts had been issued and an accurate standard of weights and measures had been introduced.

Mr. Hassler was succeeded as superintendent by A. D. Bache. Under his administration the work of the survey was greatly extended, the survey of the Atlantic coast was continued on an enlarged scale, and operations were extended to Texas and the Pacific coast. In 1846 the first determination of difference of longitudes by means of the electric telegraph was made between Washington and Philadelphia. An improved method for obtaining latitudes astronomically was also introduced. During the Civil War the regular work of the survey was practically suspended, but the records in the office in the form of maps, charts, etc., and the local knowledge of the southern states possessed by the members of the survey was of great value to the army and navy.

Mr. Bache died in 1867, and was succeeded by Benjamin Pierce, who served until 1874. During his administration the triangulation into the interior for the purpose of connecting the triangulations of the Atlantic and Pacific coasts was begun, and the service has since been designated Coast and Geodetic Survey. Reconnaissance parties were sent into Alaska after its purchase, and a survey of Lake Champlain was completed. The succeeding superintendents were C. P. Patterson (1874-1881), J. E. Hilgard (1881-1885), F. M. Thorn (1885-1889), T. C. Mendenhall (1889-1894), and W. W. Duffield (1894-1897).

Mr. Duffield was succeeded by Henry S. Pritchett on Dec. 1, 1897. At the beginning of his administration a most important change took place in the personnel of the survey, as was the case during and for some time after the Civil War, in the withdrawal of the naval officers (who were serving as assistants in the survey), consequent on the war with Spain. Prior to this time they had charge of nearly all hydrographic and coast-pilot work, most important factors to the navigator. The work of the survey, however, has steadily continued, illustrating the admirable plan of its organization. In 1898 congress extended the duties of the survey to all coasts under the jurisdiction of the United States; the survey of Puerto Rico was begun the same year, and arrangements have been made for taking up the survey of Hawaii. A hydrographic party surveying the mouth of the Yukon river in 1898 discovered a channel carrying 7 feet greater depth over the bar than that now used, an important matter, as the greatest draught of vessels now trading into the river is 6 feet. This party also found that the coast line at the mouth of the river is 25 miles farther west than as shown on the charts. The steamer *Pathfinder*, completed in June, 1899, was designed for Coast Survey work on the outside coast of Alaska and among the Aleutian islands. During the winter when the Alaskan work is suspended, she will be utilized for work in Hawaii.

SYSTEMS OF TRIANGULATION.

Field operations.—Generally, in land surveying, the distances are measured direct by means of a tape or chain. But when the survey is intended to embrace a vast territory, or when the greatest precision is desired, this method becomes impracticable, and the process of triangulation is resorted to. This consists, in the simplest case of a single triangle, in measuring one side, called the base, and the angles of the triangle, and then deriving the other two sides by computation. Similarly, either of the computed sides may be made the base for a second triangle, and so on indefinitely. The triangulation, together with the determination of geographical positions by means of astronomical methods, is the base on which the balance of the survey rests, and that connects the surveys of widely different localities.

A primary system of triangulation extends along the Atlantic coast from the northeast boundary to the Gulf of Mexico, and another, con-

necting the systems of the Atlantic and Pacific coasts, extends from Cape May, N. J., to Point Arena, Cal. In the primary triangulation the sides of the triangle are made as long as practicable, and vary from 10 to nearly 200 miles. The longest side observed was that from Mount Helena to Mount Shasta, over 190 miles. In flat wooded country it is often necessary to elevate the instrument, sometimes as much as 150 feet, on houses or specially constructed wooden structures, in order to see over intervening obstacles. In observing lines of great length, 100 to 200 miles, wooden supports for the instrument are unsatisfactory, and brick, stone or cement are used. On the longer lines a heliotrope is used as the signal to which the telescope is sighted. The heliotrope is a mirror so arranged that a ray of sunlight is reflected along the line of sight towards the distant telescope. Series of smaller triangles based upon the primary triangulation furnish points for the topography and hydrography.

In connection with the triangulation base lines are measured in favorable localities, the unit of length being the metre. As any error in the base is multiplied as many times as it is contained in the entire distance covered by the triangulation, it is evident that a small error in the former may give rise to a large error in the latter. This makes it necessary to measure bases with the greatest care and precision attainable. Many forms of base apparatus have been used, the principal difficulty being to allow for or eliminate the effect of temperature. On the Holton base line, Indiana, intended to check the transcontinental triangulation east of the Mississippi river, a five-metre bar enclosed in a mixture of melting ice, thus eliminating the effect of temperature, was first used. A tape line is sometimes used by having specially prepared supports, stretched by a definite tension, and making allowance for temperature, its length being known under these conditions. In Alaska, where favorable sites for base lines are difficult to find, a base has occasionally been measured for the survey of an isolated body of water by means of a wire several miles long strung over the water, with its ends on shore, and supported at one-half or one-quarter mile intervals by boats, and stretched by a definite tension. The length of wire between marks is then ascertained by winding it on a reel, and making suitable compensation. This method, however, is very rough, and would not be tolerated in a more important locality. As illustrating the refinement in the triangulation and base measurements, it may be stated that in a portion of the Atlantic coast primary triangulation between the Maryland and Georgia base lines, 602 miles apart, the error was scarcely perceptible, being little over half an inch in a thirty-mile line.

At favorable points in the primary triangulation, observations are made astronomically for latitude, longitude and azimuth. The latitude is determined by what is known as Talcott's method, and consists in the observation by means of a zenith telescope of pairs of stars culminating (crossing the meridian) at nearly the same time and at nearly equal altitudes above the horizon on opposite sides of the zenith. The telescope is pointed on the first star when in the meridian and the vertical movement is clamped; it is then turned 180° in azimuth, its altitude remaining the same, and the second star is observed in the meridian, the difference of altitude between the two being obtained by means of a micrometer. The stars' distances from the equator are known by their declinations, contained in star tables; the position of the zenith with reference to the stars is determined by the observation. This gives the distance of the zenith

SLIGHT PROBABLE ERROR IN LATITUDES.

from the equator, which is the latitude. Observations of this character when first taken made it necessary to prepare more accurate star tables, but they are now such that latitudes are determined with a probable error not greater than 10 feet.

The earth turns with a uniform motion on its axis from west to east in 24 hours. If the times of transit of a star across two meridians are observed, it is evident that the time taken by the star from one meridian to the other can be obtained by a comparison of the clocks. This comparison is now made by the electric telegraph, assisted by the chronograph for purposes of accuracy. The difference in the times of the transit of the star over the two meridians, owing to the uniform motion of the earth, gives the difference of longitude in time, and multiplied by fifteen gives the difference of longitude in degrees, minutes, and seconds. These methods of determining latitude and longitude are the most important adjuncts of geodetic surveying, and add immensely to the accuracy of its results. The azimuth gives the direction of the triangulation with reference to the meridians. It is determined by observations on circumpolar stars (those that are never below the horizon), whose motions are slow on account of their proximity to the pole.

Topography has for its purpose the charting of the land area, and outlying islands and rocks showing above low tide, and extends as far inland as necessary for the purposes of navigation and coast defence. After the completion of the triangulation and the determination of the necessary points for the further survey, the triangulation points are plotted by means of their latitudes and longitudes on a sheet of drawing paper (called a projection), having on it a polyconic projection of the meridians and parallels. The topographer then occupies the triangulation points with a plane table and fills in on the chart all features both natural and artificial that are necessary for a complete survey. These include the limits of forest and cleared land, marshes, railroads, roads, church spires and other prominent objects, houses, light-houses and other aids to navigation, etc. The elevation of the country is shown by contour lines, or curves of equal elevation, at different intervals, according to the nature of the country and the scale of the projection. The topography on the chart enables the navigator to judge of the aspect of the coast, and avail himself of all prominent objects in shaping the course of his vessel.

Hydrography has for its province the survey of the water area for the completion of the chart. For this purpose soundings are made to determine the contour and character of the bottom and to develop the channels and hidden dangers; observations are made on the rise and fall of the

tides and the times of high and low water, both to reduce the soundings to a common level (mean low tide on the Atlantic coast) and to supply the data necessary to construct a tide table for the chart; and the direction and velocity of the currents are ascertained at the different stages of the tide. Careful note is also taken of the appearance of the land and of all remarkable objects on the shore which may be useful as landmarks. The hydrographic operations of the survey have extended as far out from shore as was necessary for the interests of navigation. Deep-sea soundings have been made in many places, the most extensive surveys of this character being the Gulf of Mexico and Gulf Stream. During the study of the latter the "Blake" was anchored in over 2,000 fathoms (12,000 feet), and made successful current observations by means of a meter at depths of $3\frac{1}{2}$ to 300 fathoms. The survey has nine steamers and three schooners at present engaged in hydrographic work.

The tides are subject to many variations dependent upon the movements of the sun and moon. In addition to the tidal observations made during the progress of the hydrographic survey, already referred to, others are made at selected stations through long periods of years, sometimes for a full lunar cycle of nineteen years, for the purpose of studying the complicated laws governing their movements. As a result of these observations and investigations tide-tables are published annually by the survey six months in advance, in which are predicted the times and heights of the tides for every day of the year at seventy-one principal ports of the world, and, by means of tidal constants to be supplied to the predictions for the principal ports, 3,000 subordinate stations are included, so that the

1. Sailing charts, mostly on a scale of 1-1,200,000, which exhibit the approaches to a large extent of coast, give the off-shore soundings, and enable the navigator to identify his position as he approaches from the open sea.

2. General charts of the coast, on scales of 1-400,000 and 1-200,000. In these, intended especially for coastwise navigation, are shown the configuration of the shore, the positions of islands, rocks and shoals, the light-houses, life-saving stations, and other natural and artificial landmarks.

3. Coast charts, on a scale of 1-80,000, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors, and to recognize the beacons, buoys and light-houses by their distinctive features and positions.

4. Harbor charts, on large scales, intended to meet the needs of local navigation.

The aids to navigation are corrected on the charts as issued to conform with changes indicated by the United States Light-House Board. To assist users of charts in keeping them up to date, corrections to be applied are issued monthly under the title of "Notice to Mariners." Announcement of new charts, new editions of charts, charts cancelled, editions cancelled, and of the various new publications of the survey are also made in these "Notices."

A series of seven coast pilot volumes covering the Atlantic and Gulf coasts, one, the coast of California, Oregon, and Washington, and one, southeast Alaska, including the inland passage from Strait of Juan de Fuca to Dixon Entrance, are published by the survey. These publica-



NEW STEAMER PATHFINDER OF THE UNITED STATES COAST AND GEODETIC SURVEY.

tables cover the entire navigable world. A treatise on tides is also published in the tables which may be of interest to those who wish to pursue the subject further.

The variation (declination) of the compass is an element of great importance to the navigator and land surveyor. It varies in regard to time and place, and it is therefore not only necessary to know its amount, but also the laws that govern it, so that it may be known in advance. Observations have been made at many places throughout the country. The observations of the survey and those made by others have been analyzed, and as a result the direction of the needle can be foretold for the future and revealed for the past within certain limits.

PUBLICATIONS OF THE SURVEY.

Publications.—Those of most interest to the mariner are charts, coast pilots, tide tables, and notices to mariners. The charts are made from the surveys of Coast Survey parties, with the exception of some portions of Alaska which are not yet surveyed. The charts are classed as finished and preliminary. The finished charts are printed from engraved plates, and embody all information furnished by the survey to the minutest detail. The preliminary charts, those issued as soon as possible after the surveys, in whole or in part, have been made, and are used to supply the pressing demands of navigation pending the publication of the finished charts. They are either engraved or photolithographed. The preliminary and finished charts differ only in regard to the amount of information which they furnish, not in correctness of that which is given. The charts are various in character, according to the objects which they are designed to subserve. The most important distinctions are the following:

tions are based mainly upon the work of the survey, including the results of special examinations and investigations carried on in connection with their preparation. Those of the Atlantic and Gulf coasts are standardized as a result of the study and experience of many years. They include tabular descriptions of light-houses, light-vessels and fog signals; lists of life-saving stations, weather-bureau wind signal display stations, and seacoast telegraph stations; and information regarding tides, tidal currents, variation of the compass, etc.; general information concerning the harbors, including notes relative to pilots and pilotage, tow-boats, depth of water, draught of vessels entering, harbor and quarantine regulations, supplies, facilities for making repairs, usual or best anchorages, and other matters of practical utility; sailing directions, with subordinate paragraphs treating of prominent objects, dangers, aids to navigation, etc. In the arrangement adopted the aim has been to conform, as far as practicable, to the order in which these matters would be considered in practice, and to render available such information as may be wanted promptly. The coast pilots are corrected for all important information received up to the date of their issue from the office.

The annual report of the superintendent is published each year. This consists mainly of a review of the progress of the work during the year; a summary of the means proposed for promoting its efficiency; estimates for future progress; an abstract of work done in the field and in the office, with sketches illustrating the statements of progress. Professional papers relating to the methods, discussions and results of the survey are usually appended. Bulletins are issued by the survey from time to time, as material for them accumulates. They are intended to give early announcement of work accomplished, or information of importance obtained, and

will in many cases anticipate the usual means of publication afforded by the annual reports.

OTHER WORK OF IMPORTANCE TO THE SCIENTIFIC WORLD.

In addition to what has been enumerated, the work of the survey is important in other respects to the nation and to the scientific world. Its triangulations furnish points for state surveys, and have been used extensively for this purpose. The triangulations of any extent furnish arcs for the determination of the size of the earth. The longest and most important of those completed are the oblique arc from Maine to the Gulf of Mexico, and one on the thirty-ninth parallel from Cape May, N. J., to Point Arena, Cal. The Coast Survey has been called upon for surveys to define the boundaries between many of the states, the northeast boundary and the Mexican and Alaskan boundaries. Pendulum observations, which determine the force of gravity and approximately the shape of the earth, have been made by the survey in connection with national and international scientific expeditions in every country of the world. Its charts and surveys are also records in the matter of changes along our coast, enabling the engineer to plan intelligently the various works for the improvement of our harbors. The standard weights and measures of the United States are preserved by the weights and measures division of the survey. Copies of the standards are furnished to the several states of the union and various departments of the government as prescribed by law. This division is of importance also to engineers, surveyors and others who wish to have their tape lines and other length measures verified, and state governments, individuals, scientific institutions, or manufacturers who desire a comparison of their weights and measures. All such verifications will be undertaken and a statement issued showing their relation to the United States standards.

COAST SURVEY STEAMER PATHFINDER.

There is printed herewith a picture of the steamer Pathfinder, the latest addition to the fleet of the coast and geodetic survey and perhaps the most perfectly equipped vessel in the world for such service. The Pathfinder, which is a product of Lewis Nixon's Crescent Ship Yard at Elizabethport, N. J., was designed especially for work in Alaskan waters and the Bering sea. She is of steel construction, 165 feet in length on the water line, 33½ feet beam and of 875 tons displacement on a mean draught of 10 feet. The whole construction is of exceptional strength. There are seven watertight transverse bulkheads and under the engine and boiler space a double bottom, which serves as a tank for fresh water. There are three decks, the lower one being of steel, sheathed with wood and watertight. The engines are of the vertical triple expansion type, with cylinders of 18, 27 and 44 inches diameter and 28 inches stroke. They are capable of developing 1,173 horse power and drive the vessel at a speed of 12 knots. Steam is supplied from two Scotch boilers with a pressure of 160 pounds. The equipment of the vessel is thoroughly modern including steam windlass and steering gear, mechanical telegraphs, voice tubes, electric call bells, electric fans, etc.

ERIE CANAL ENLARGEMENT.

Editor of Marine Review:—I am forced to take notice of an article from Mr. Chamberlain of Buffalo, published in the Marine Review of Sept. 12, in which he comments upon some immaterial statements found in my letter upon canal enlargement, published in the New York Sun of August 31, and partly reprinted in the Review.

Among other criticisms he strongly intimated that I must have been ignorant of the fact (a fact I did not state) that there were railroads in this country twenty years before Clinton projected the Erie canal. I did state that had Clinton, twenty years before he projected the Erie canal, introduced railroads instead, not a canal would have been constructed in this country. He has not denied this proposition, and therefore, so much of my argument "holds water," for it must be taken as true.

Now as to my "Munchausinism." If Mr. Chamberlain had read up as fully on the subject of railroads and their first introduction in this country as he has on canals up to 1882, when tolls were abolished on the Erie canal, he would have seen in the New York Daily Tribune, in the local press of Orange and Sullivan counties, and Wayne county, Pennsylvania, that I was quite familiar with the history of railroads in this country as to when and where they were first established and by whom. I believe that in discussing a subject a person may be allowed in making illustrations to assume certain conditions. So much for my "prodigious Munchausinism." This Buffalo canal "expansionist" again criticises my statement that canals are not constructed on lines parallel to railroads, and to disprove my position instances the Manchester ship canal in England. One other of my critics in the New York Sun, when discussing the subject, had fairness to concede that I did not probably mean to place such canals in the internal-canal category. They are not operated by horse power, or men or women, as some canals are in China, and even in Europe, nor are canal boats used upon them any more than ships of war are used on the Erie canal. Be this as it may, he cites the Manchester ship canal to disprove my statement, but instead of his disproving mine, history disproves his, and confirms me, for the Manchester canal was constructed more than seventy years before any railroad in the world was thought of, after which 2,200 miles of canals were constructed in Great Britain, nearly all of which have fallen into disuse through the influence of railroads as competing transportation lines; the same result that must follow everywhere in this country unless the people are taxed by the government to sustain or foster canals as this state has been doing for the last seventeen years. If my arguments don't "hold water," my further argument is that the Erie canal does "hold water" and enough without enlargement for all practical purposes. But I would not complain so much at this, were it not for the insatiable desire in some quarters to loan money, contract enormous interest-paying debts to enlarge the Erie canal, when its capacity is already and has been since enlargements to its present dimensions, millions of tons in excess of all demands upon it. During all the years of scandal, robbery and plunder while the \$35,000,000 enlargement scheme was going forward, I stood "tempered to the wind like the shorn lamb," acting with the canal power until 1867, when a further enlargement scheme, brought forward by the Clintons, Gansons, Prossers, Hatches and Barnards of Buffalo, the Alvords, Andrews, Hiscocks of Syracuse, and others on the line of the canal, secured a provision in the new constitution permitting a \$9,000,000 appro-

priation for enlargements, which the people voted down, and which was reinstated by the convention of 1894, and adopted by the people, and which finds its realization in the \$9,000,000 appropriation last year. It has been more than spent, and the most assiduous efforts of the patriots of all parties are being taxed to their wits' ends to find what has become of it and how the balance sheets now stand.

As to the present capacity of the Erie canal, let us look a little into science on the subject for a necessity to enlarge the canal. John B. Jervis, who had the engineering of the enlargement of 1835, one of the, if not the ablest engineer of his time, and who made it the best work of the state, stated officially that the enlargement would increase the capacity three-fold (see Ass. Doc. No. 254, 1835, page 17). Mr. Ruggles, an able canal commissioner, in 1838 estimated that the enlargement would increase its capacity seven times the original capacity, and make it capable of carrying 10,000,000 tons annually (see Ass. Doc. for 1838, No. 242, page 17). Mr. Seymour, state engineer, in 1854, when the celebrated nine-million bill was passed, in order to obtain a more speedy completion of the enlargement, made an estimate similar to the foregoing, but I have not the figures before me. Mr. McAlpine, in his famous report in 1853 and again in 1854, stated the enlargement capacity to be 7,000,000 of tons per annum. Mr. Richmond, a well-known state engineer, in 1861 asserted that the canal could deliver at tide water 5,220,000 tons (see Ass. Doc. for 1862, No. 8, page 23). Besides this the canal auditors have repeatedly asserted that the capacity of the canal has never been reached, except in an exceptional year during the Civil War (1862, when the Mississippi was closed by rebels), within 4,000,000 tons each way. The original capacity of the canal was 1,500,000 tons. Can it be possible that in view of these facts and figures, especially when official figures are not shown by the Buffalo statistician as to what the maximum tonnage in any one year carried over this canal has been, that he will still insist upon enlargement and state debts? We must assume as an official fact that the canal capacity has not only not been diminished since the enlargements, but it has never been reached within millions of tons. The talk about the minerals of the Lake Superior region finding transit over this canal is too speculative to deserve consideration. It was an extreme, if not doubtful, exercise of the power of the state to give away the people's property and its income to shippers and freighters.

Our canal system was the inspiration of De Witt Clinton. My father was a Clintonian, which was a party name in his day. The principle of finance respecting our public works, recommended and urged by Gov. Clinton, were entirely catholic and sound, and as they were observed by him in the beginning, so they should be maintained to the end of our canal policy. In his memorable message of 1817, he recommended tolls to be fixed for the use of the canal and that they should be sacredly set apart and used to repay all advances made by the state for their construction and maintenance. He also urged that the revenues from the salt springs, the custom duties, and other outside means should be applied towards the liquidation of the canal debts. No man in our history, who has occupied the executive chair, regarded more scrupulously the principles of public integrity than he. His doctrines thus announced finally found adoption in our constitution. He was the author of the doctrine that our canal revenues should be faithfully kept separate from other funds of the state, and that all moneys advanced on their account should be repaid. He was opposed utterly to taxation for internal improvements. His great heart and soul would have revolted at the thought of abolishing tolls on our canals for the benefit of forwarders and freighters, and tax the people to enlarge and maintain them. His non-taxation policy was maintained in several of his messages and until he died. In the convention to revise our constitution in 1867, I opposed an amendment to the constitution allowing an appropriation of \$9,000,000 to enlarge the Erie canal, but the canal influence carried it, and the people voted it down. The convention of 1895, after an inhibition of nearly fifty years, changed the organic law and allowed the \$9,000,000 appropriation to enlarge the Erie canal, following up the free-toll iniquitous acts of 1882, which has again launched the state upon the sea of official scandal and is now again scathing in the cauldron of state politics.

Mr. Chamberlain did answer some of my inquiries, the least important. He did not answer respecting the tonnage of the canal, past and present, whether increasing or otherwise, nor how much of the 363 miles of the Erie canal the \$9,000,000 appropriation had enlarged, and what it would take to widen the remaining miles; what the present maximum capacity of the canal is, and if it had ever been reached; what cities, villages and towns our canal, unaided by railroads, rivers or seaport, had built up; and finally, which, if the people were compelled to make a choice, they could the better dispense with; not one of these inquiries or questions were considered or referred to in his letter. There are eight distinct propositions or questions dodged by my canal expansion critic, though he claims to have considered them all; questions deeply important when considering this matter of enlargement and further taxation of the people in aid of individual and private enterprise and interests.

I observe that some canal "expansion" advocates are counting largely on lake commerce to supply and augment the canal trade. But it is claimed that our lakes are already "bled" to such an extent for canals, sewerage, electric and manufacturing purposes, that their waters may be so reduced as to interfere with lake navigation, after an expenditure by our government of untold millions in dredging and other improvements. No matter, take all chances and enlarge the Erie canal, is the cry. Well, there is still a "power behind the throne" that may be felt and heeded. A few more \$9,000,000 "grabs," more than equal each time to the original cost of the Erie canal, will be sufficient to close this long-played "Comedy of Errors," and with a sufficient "expansion" of honesty and all-round integrity this great and renowned internal water-way may still be made useful to the people.

C. V. R. LUDINGTON.

Monticello, N. Y., Sept. 15, 1899.

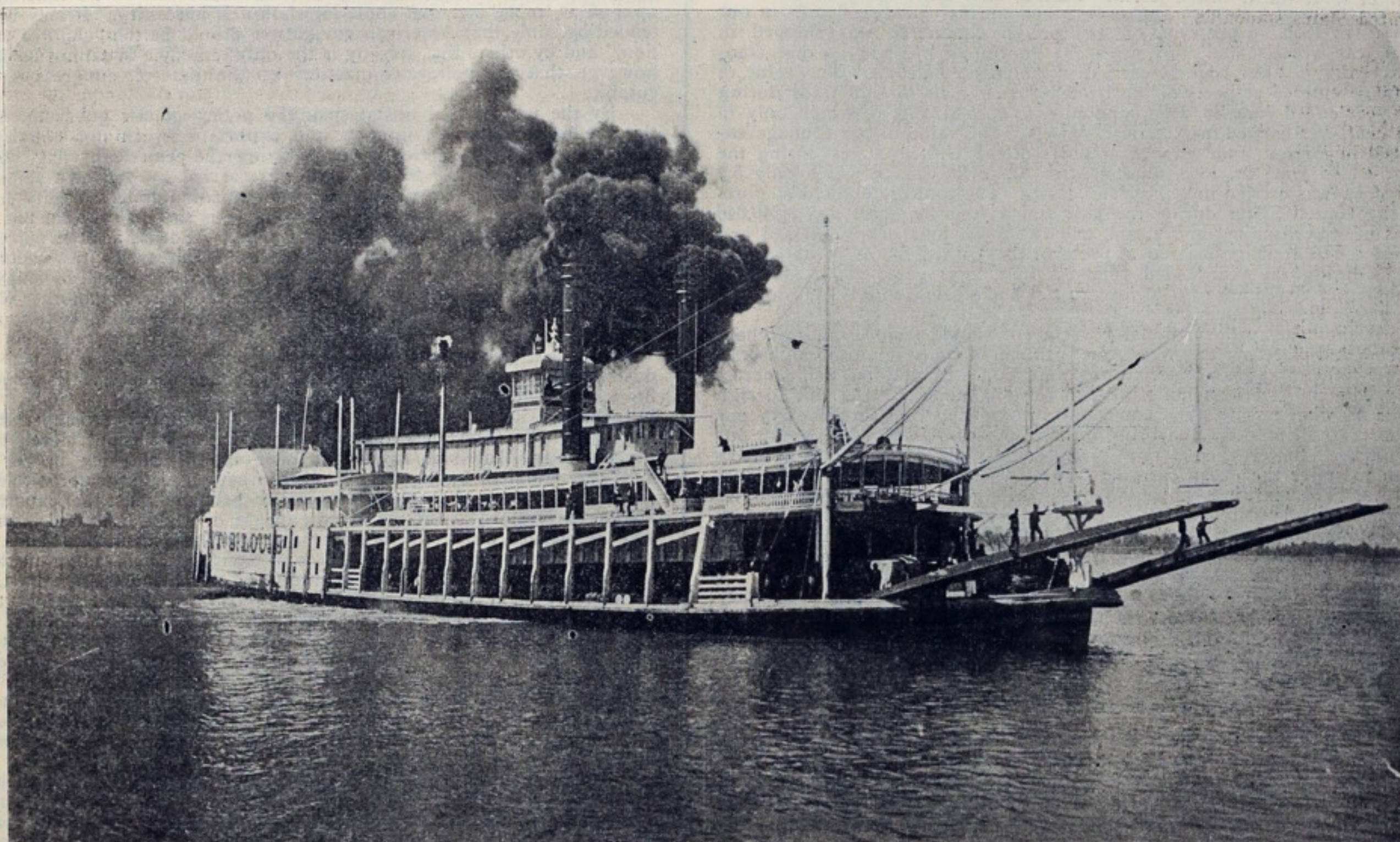
The Nickel Plate road offers the low rate of one fare for the round trip to Chicago, account the fall festival and government building dedication. Tickets available Oct. 2 to 10 inclusive, good returning by deposit until Oct. 14 inclusive, on any one of our peerless trio of daily express trains where scheduled to stop. See agents. 151, Oct. 10.

WAR VESSELS BUILDING AT BATH.

Bath, Me., Oct. 2.—The Bath Iron Works is now building five torpedo boats and one monitor for the United States navy. During the past six years this company have completed six vessels for the navy department and they have also built five vessels for the United States treasury department, besides repairing and rebuilding vessels for the treasury and war departments. The torpedo boats Dahlgren and T. A. M. Craven will probably be handed over to the navy department in two and four months respectively. The Dahlgren is practically complete as she is now being gradually tuned up for her official speed test. She has already traveled at the rate of 31 knots in dead water and she has averaged $30\frac{1}{2}$ knots, her contract speed, for about 15 minutes, so there is no doubt but that she will be in a position in a few weeks to show the official trial board that the Bath Iron Works can do what all the experts in the country have frequently said is impossible, viz: obtain a mean speed of $30\frac{1}{2}$ knots on a trial displacement of less than 150 tons with the stipulated navy trial load. The Dahlgren is a remarkable boat and as yet no defects in her hull and machinery have been discovered. There has been no accidents or breakdowns at all and this fact proves beyond doubt that excellent material has been carefully worked into the vessel and her machinery by first-class, competent mechanics, and above all, that she has been well and skillfully designed throughout.

The T. A. M. Craven, which was put into the water a few days ago, has been all ready to launch for over six months, but the Bath Iron Works wanted to get the Dahlgren accepted and handed over to the government before they commence tuning up the Craven. The Bath company has also three other first-class torpedo boats under contract, viz: Bagley, Barney and Biddle. These three boats are not very far advanced at present, the

plating is 40 per cent. in position and the deck beams and lower course of deck plating are well advanced. The majority of the bulkheads below deck are in position and a good part of the work erected, riveted and caulked. The vessel is now at least 18 per cent. completed and her machinery is well advanced. The Connecticut was originally 225 feet long, with a displacement of 2,700 tons, but she has been lengthened 27 feet, making her now 252 feet long on the water, 255 feet long over all, 50 feet beam, 15 feet depth at side, 15 feet 9 inches depth at center, 12 feet 6 inches draught and 3,200 tons displacement. The machinery consists of two vertical inverted cylinders, direct acting triple expansion engines, driving twin screws. Each has a high pressure cylinder of 17 inches, an intermediate of $26\frac{1}{4}$ inches and a low pressure cylinder of 40 inches diameter; the stroke of all the pistons being 24 inches. The collective I. H. P. of propelling engines will be 2,400 when working at about 200 revolutions per minute, which is equivalent to a piston speed of 800 feet per minute. The steam pressure is 250 pounds at the boilers. The boilers of the Connecticut will most probably be of the Niclausse type. Four will be fitted, the total grate surface being 220 square feet. The Connecticut is protected by an armor belt which extends throughout her length. It is 11 inches thick and 5 feet wide amidships, and it tapers to 5 inches thickness at each end of the vessel. The main armament consists of two 12-inch B. L. R. of the most modern approved type, well protected by a barrette and balanced Hichborn turret. There are also four 4-inch R. F. B. L. R. and three 6-pounders and two 1-pounder R. F. guns. The Connecticut will be a strong vessel with great endurance and the Bath Iron Works intends to give great thought to the many details that have been found defective in monitors at present in commission. Foremost amongst these defects is the method of ventilation. The Con-



Mississippi River Passenger Steamer City of St. Louis.

machinery being much further ahead than the hulls. Now that the Craven is launched, the keels of the three new boats will be laid in the closed-in building shed in which the Dahlgren and T. A. M. Craven were built. The Bath works offered to guarantee a speed of $29\frac{1}{2}$ knots per hour for the new boats but the department insisted on a weight of 10 tons being added and therefore the builders insisted on the speed being lowered to 28 knots. The following figures tell at a glance the difference between the vessels of the Dahlgren and Bagley class:

	Dahlgren Class.	Bagley Class.
Length over all	151 ft. 7 in.	157 ft. 4 in.
Length L. W. L.	151 " 3 "	157 " 0 "
Beam	16 " 4 "	17 " 0 "
Depth at side	9 " 4 "	10 " 0 "
Depth at center	10 " 0 "	10 " 9 "
Displacement	151 tons.	167 tons.
I. H. P.	4200 "	4200 "
Speed	$30\frac{1}{2}$ knots.	28 knots.

All the five torpedo boats built and building by the Bath company have similar machinery. Each vessel is fitted with two direct acting surface condensing triple expansion engines driving twin screws. The cylinders are 17, 25 and 37 inches diameter respectively, the stroke being 21 inches. Each vessel is fitted with two large water tube boilers with 118 square feet of grate and of the Normand express type. The working pressure is 230 pounds and the grates are 9 feet 6 inches long.

The U. S. Monitor Connecticut is now all framed out at the yard of the Bath works. The inner bottom plating is 75 per cent. laid, the shell

necticut will have, it is said, eight large blowers to ventilate the space below deck. The Connecticut, unless delayed for armor, will be completed on time as per the contract, viz: twenty-seven months from the date of signing the contract.

A cargo of 8,215 net tons of ore (7,335 gross tons) was delivered at South Chicago from Two Harbors a few days ago by the Minnesota company's steamer Malietoa, recently completed at the Lorain works of the American Ship Building Co. The Malietoa was on an even keel drawing 18 feet $\frac{1}{2}$ inch. She is commanded by Geo. Mallory, commodore of the Minnesota fleet.

Great regret is felt in shipping circles all over the great lakes by reason of the death of Townsend Davis of the well known insurance firm of Smith, Davis & Co., of Buffalo. Mr. Davis had been actively identified with lake vessel interests both as owner and in the capacity of representative of insurance interests for a great number of years, and few men were better or more favorably known.

Manning, Maxwell & Moore of New York have just shipped to a German iron works the largest piece of machinery ever sent over the ocean. It is a boring machine capable of boring cylinders no less than 20 feet in diameter. The spindle is 12 inches in diameter and the machine has a center elevation of 10 feet from the face of the bed plate. The machine weighs more than 80 tons and cost \$15,600.

FROM THE STATE OF ILLINOIS.

INTEREST IN LEGISLATION FOR OUR MERCHANT MARINE.

Patriotic citizens in Chicago and other parts of the state of Illinois have responded in plain language to the request of the Marine Review for expressions of opinion on the subject of what is best to be done for our merchant marine in the foreign trade. The questions upon which these communications are based are as follows:

1. Shall the United States continue to allow its merchant marine in foreign trade to fight a losing battle until it entirely passes out of existence and foreign nations absorb the ocean carrying of our entire import and export trade?

2. Shall the United States decide, as its permanent nonpartisan public policy, that an equitable share of its imports and exports must be carried on vessels of the United States, built in our own ship yards and flying our own flag, and that congress will enact whatever national legislation may be needed to stimulate and encourage our citizens to create, maintain and operate the vessels this policy calls for?

3. If it is recommended that congress shall enact remedial legislation what shall it be, and why?

FROM THE SECRETARY OF THE CHICAGO BOARD OF TRADE.

Editor Marine Review: The ocean carrying trade of the United States has steadily diminished and no American can turn with pride to its condition as it recedes from view. The national flag which should float above American commerce on all seas is seldom seen at the masthead, and the spectacle of a foreign flag over American merchandise flaunts in our faces. In 1856, 75 per cent. of our foreign commerce was shipped in American vessels, and now, with the enormous increase in that commerce, only 9.3 per cent. is carried in American bottoms. The value of tonnage entered at ports of the United States in its foreign trade during the year ended June 30, 1898, amounted to \$585,612,870, of which only 16 per cent. was carried in American vessels. The value of our tonnage engaged in foreign trade cleared at ports of the United States during the year ended June 30, 1898, amounted to \$1,158,198,626, of which only 5.9 per cent. was carried in American vessels. The tonnage entered at ports of the United States during the year ended June 30, 1898, was 5,240,046 tons of American sail and steam, and 20,339,353 tons of foreign sail and steam. The tonnage cleared at ports of the United States in its foreign trade during the year ended June 30, 1898, aggregated 25,748,232 tons, comprising 20,636,785 tons of foreign sail and steam and 5,111,447 tons of American sail and steam.

Without delay the national government should restore our merchant marine and place her flag over American merchandise upon the high seas, where some of its proudest victories were won. By national aid, if necessary, launch American hulls for American commerce. Let not foreign trade do what hostile guns could not accomplish. We should carry our exports to all markets and bring hither our imports in vessels flying our own flag. Better even admit foreign-built ships to American registry than to suffer the ocean carrying trade to pass from under the national ensign. The maritime power of this nation must be restored, and we should be aroused to a sense of the danger and decay which threaten it. The statesmanship of Washington and Jefferson in placing the maintenance of the merchant marine among the chief safeguards of national security, should never be forgotten.

History teaches without a single exception that national effeminacy accompanies the degeneracy of the merchant marine, and that the decline of maritime power is followed, sooner or later, by the decadence of enterprise and commerce.

GEORGE F. STONE.

Chicago, Sept. 28, 1899.

FROM A LEADING ADMIRALTY LAWYER.

Editor Marine Review: As American ships cost more than foreign ships and American crews receive higher wages than foreign crews, it is, therefore, impossible for the American ships engaged in the foreign carrying trade to compete with foreign ships, and it is for this reason that we are losing ground in the foreign carrying trade. It is the survival of the fittest and the cheapest.

Our foreign carrying trade is an important factor in the development of the resources and prosperity of this country, as well as any other commercial country. If we desire to build up foreign markets for what we produce and manufacture, we must have ships to carry them, and the only way in which we can induce Americans to engage in the foreign carrying trade is to give them government aid. Other countries encourage the establishment and maintenance of steamship lines with foreign countries by giving subsidies, or well-compensated mail contracts. This country must under the circumstances do the same thing, or necessarily lose its foreign carrying trade.

The form which this government aid is to take is a matter of detail and can, no doubt, be satisfactorily arranged, so as to avoid the paying of unreasonable amounts, or the encouraging of speculators or others who would profit by the government aid, without benefit to the country or the people. Unfortunately, if any one party takes up a question of this kind (which ought not to be a partisan question), it immediately becomes a partisan question, for what one party proposes the other, therefore, opposes.

The bill introduced in the last congress was in the main a good one, although some changes in it were necessary, because it was inclined to be too extravagant. I think it would not be difficult for the men engaged in the foreign carrying trade to frame such a measure as would encourage the foreign carrying trade, without any abuse of the encouragement. If our members of congress who are statesmen will call to their aid men familiar with the trade, it ought not to be a difficult matter to frame and pass satisfactory acts of congress.

To those who oppose subsidies, I would say that "free ships" is not the cure so long as American crews receive higher wages than foreign crews. There is today but little difference between the cost of a foreign and an American-built ship, but the difference in wages is becoming

greater every year as American seamen become scarcer. Unless, therefore, Americans be allowed to buy and sail foreign-built ships manned by foreigners, our foreign trading shipping must go down, or be kept up by government aid until a route or trade can be so firmly established and be so profitable that further aid is no longer necessary.

To the American statesman I would say about our foreign shipping: If you hold it dear, don't let it die, for it cannot live without you.

C. E. KREMER.

Chicago, Sept. 28, 1899.

FROM THE HEAD OF A CHICAGO MILLING CONCERN.

Editor Marine Review: It must be apparent to every observer of current events that the policy of "how not to do it" pursued by congress of late years, is absolutely ruinous to what was once the pride of our country, our merchant marine. No matter where you go, either Continental Europe, the United Kingdom or Asiatic ports, you will find an absence of American shipping. Nowhere can any merchant ships be discovered flying the Stars and Stripes, while on the other hand, the flags of all other nations can be seen in nearly every shipping port on this globe. What ever the cause may have been that has led to this deplorable condition, there must be a remedy.

Men may differ as to what remedial legislation should be enacted by congress to correct the existing evil, but there can be no difference of opinion as to the fact that some legislation is necessary. It may be contended by some that American navigation should be the "child of protection," and by others that subsidy is the only remedy. It cannot be denied, however, that the policy of inaction on the part of congress is inexcusable.

By the unwise and unstatesmanlike policy of our government only the smallest fraction of imports and exports between our country and foreign countries is carried by ships flying the American flag, whereas seventy years ago fully 90 per cent. was carried by our own ships. Of the sixteen million barrels of flour and one hundred and fifty million bushels of wheat exported by us last year, it is safe to say that but about 8 per cent. was carried by our own vessels. At least a large percentage of the \$150,000,000 to \$175,000,000 that competent authorities estimate is annually paid in freight to foreign vessels should be earned by ships built and owned by citizens of the United States. But there is another view to take of this question which is very tersely stated by Thomas Jefferson in his report to congress while secretary of state in 1793, when he said: "Our navigation involves still higher considerations. As a branch of industry it is valuable, but as a resource of defense essential. Its value as a branch of industry is enhanced by the dependence of so many other branches on it. In times of general peace it multiplies competitors for employment in transportation, and keeps that at its proper level; and in times of war—that is to say, when other nations who may be our principal carriers shall be at war with each other—if we have not within ourselves the means of transportation, our produce must be exported in belligerent vessels, at the increased expense of war freight and insurance, and the articles which will not bear that must perish on our hands. But it is as a resource of defense that our navigation will admit neither of neglect nor forbearance. The position and circumstances of the United States leave them nothing to fear on their land board, and nothing to desire beyond their present rights. But on their seaboard they are open to injury, and they have there, too, a commerce which must be protected. This can only be done by possessing a respectable body of citizen seamen and of artists and establishments in readiness for ship building."

Our war with Spain clearly and most forcibly demonstrates the fact that there are no better sailors in the world than the American blue jackets, and no greater sea captains and admirals than America can produce.

In view of the enormous growth of manufacturing industries in the United States of late years, the production of which is exported to nearly every nation in the world, and the immense increase of our commerce with foreign countries, I believe that congress should be urged by the people and the press to enact the legislation approved by President McKinley and recommended by Secretary Gage in his report to congress, which will bear repeating here as follows:

"First—A remodeling and extension of the act of March 3, 1891, relating to the carrying of ocean mails in American steamships, so that it shall meet requirements which have arisen since the new law went into operation.

"Second—The establishment of a system of graded bounties upon the mileage navigated by registered American vessels while engaged in the foreign carrying trade, as compensation for the training of seamen available for the national defense, the system to have regard also to the construction of vessels which may be promptly and economically converted into cruisers, troop ships, colliers and supply ships for the use of the government. Special provision should also be made for vessels and men engaged in the deep-sea fisheries.

"Third—Extended application of the principle of the act of May 10, 1892, by virtue of which the St. Louis and St. Paul were constructed in this country upon the registry of the foreign-built steamships New York and Paris; this extension to continue for a short term of years and to be so guarded as to preserve the coasting trade to American-built vessels.

"Fourth—A moderate increase in the rates of our tonnage taxes, equalizing them with the corresponding charges at present imposed at London, Liverpool and Hamburg.

"Fifth—The restriction of the trade between the United States, Porto Rico and Hawaii and the coasting trade of those islands to vessels of American registry."

These recommendations have the merit of being specific, although they may not meet the approval of all who have given this subject consideration, but it is certainly something definite in the right direction. I am firmly of the opinion that congress should be urged by all patriotic

citizens to adopt these recommendations. It is high time that we should all unite upon some definite plan of action which may lead to the consummation of practical results.

Office of Eckhart & Swan Milling Co.,
Chicago, Sept. 25, 1899.

FROM A FORMER PRESIDENT OF THE LAKE CARRIERS' ASSOCIATION.

Editor Marine Review: In response to your invitation for expression of opinion as to what, if any, national legislation should be enacted by congress in order that the United States may increase the number of merchant vessels carrying our flag in the foreign trade, I would say:

The great need of America as a world selling nation, it strikes me, is the means of transporting our goods direct from our own ports to every corner of the globe. The second great need is to give the utmost freedom to our manufacturers in the purchase of their material. To secure these two ends the best way, in my mind, is to subsidize new lines in the form of mail contracts. These subsidies should not be excessive, and when granted it would be with the express understanding that they will be terminated within a reasonable period. If such lines have not established themselves sufficiently, say in ten years, to be profitable without government aid, then they should be abandoned.

The great objection to discriminating duties in goods carried in American bottoms is that it will inevitably tend to increase the cost of transportation, thereby placing our manufacturers at the disadvantage which we are now trying to avert. I take it that it is a self-evident truth that anything that prevents a free movement of freight surely tends to increase the cost of transportation. As the entire country is benefited by the growth of our manufactures for foreign trade, it is but right that the entire country should bear proportionately the cost of their development. Any other means will result in the burdens falling upon a few, while the many will receive the benefits.

I do not believe that excessive subsidies will now be required to develop our merchant marine. America stands today in a far different position than she did even a decade ago on these questions. Just now, perhaps, owing to the boom in iron and steel, we cannot build ships as cheaply as abroad, but boom conditions are but temporary, and doubtless within a year or two the price of steel will settle at a point that will place American ship builders on an equal plane with their foreign competitors. I have understood that in many ways American ship owners have been hampered by insurance classification, but this will right itself as soon as the volume of American business is large enough to be sought by the underwriters. If the English underwriters do not do it, American capital will be found to undertake the business.

It should be borne in mind that during the period of steady decline in our merchant marine American railroad building has been by far the largest in the world. That has absorbed immense sums of money, but the railroads are built, and the money continues to accumulate. Money will be found for legitimate steamship lines once the movement starts that way. I am therefore firmly of the opinion that reasonable subsidies at the present time will result in the rapid unbuilding of the American marine, and place it before ten years have gone by, in the same commanding position it held before the war. Without government aid there is no telling how long will be the delay of American capital going into ships for the general world trade.

J. S. DUNHAM.

Chicago, Sept. 22, 1899.

FROM A FORMER MEMBER OF THE ILLINOIS LEGISLATURE.

Editor Marine Review: The best thing congress could do for our merchant marine would be to give to it the fullest protection, so that vessels built at home from home material and home labor would be enabled to carry the most of our imports and exports. Our merchant marine certainly needs good, wholesome protective laws.

SEYMOUR MARQUISS.

Deland, Ill., Sept. 29, 1899.

FROM LIEUTENANT GOVERNOR NORTHCOTT.

Editor Marine Review: I have not the time, just at present, to give you an extended article on the subject of our merchant marine. I do want to say, however, that I am cordially in sympathy with the work and have for some time past regarded the question of our commerce as one that is ripe for development and organized action.

W. A. NORTHCOTT.

Greenville, Ill., Sept. 27, 1899.

FROM MR. J. C. EVANS, OF ANCHOR LINE, CHICAGO.

Editor Marine Review: In Chicago we are very much interested in the good work you are doing on behalf of a merchant marine on the seas, and hope by your efforts that instead of having over 90 per cent. of the exports and imports on the ocean carried in foreign bottoms, we will have the tables reversed and soon have ships built in American ship yards, flying the American flag, carrying over 90 per cent. of our exports and imports. Keep up the good work.

J. C. EVANS.

Chicago, Sept. 29, 1899.

The British Aluminum Association in its recently issued annual report makes a most vigorous defense of the practicability of aluminum for ship building purposes. It is claimed in the first place that the metal does not deteriorate to anything like the extent alleged. It is admitted that the matter of the actual construction of ships with aluminum will have to await engineering progress along that line, but it is hinted that the question of protecting aluminum by paint has not yet been gone into sufficiently.

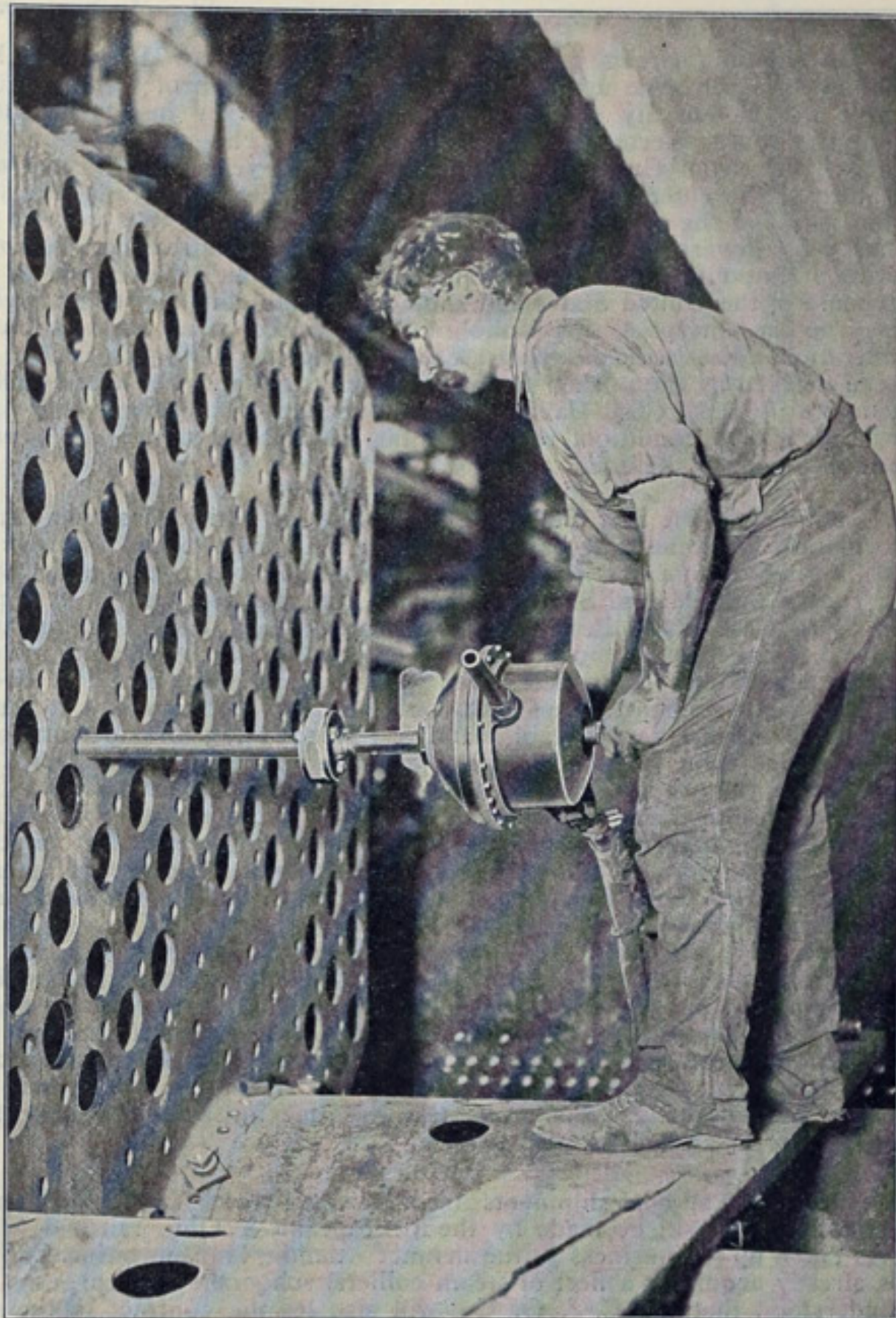
Among recent contributors to the Dewey home fund is Collis P. Huntington, well known in shipping circles through his connection with the Newport News Ship Building & Dry Dock Co. Mr. Huntington a few days ago sent the committee his check for \$2,000.

The Joseph Dixon Crucible Co., Jersey City, N. J., has just issued a very neat little booklet entitled "Making Records," which details something of the amount of help to be had from Dixon's flake graphite, in hurrying the action of steam engines.

MORE PNEUMATIC TOOLS.

The illustration presented herewith shows the Gabriel stay-bolt chuck in use with the Boyer piston air drill, manufactured by the Chicago Pneumatic Tool Co. The chuck is arranged to grasp any size stay-bolt and will turn the bolt without the necessity of squaring up the ends. In operation with the air motor, as shown, it is very rapid and efficient and effects a great saving of labor in turning in stay-bolts. This is a small machine but great in its labor saving qualities and will certainly interest all users of such devices. It is entirely new, just patented.

Ten new Boyer long-stroke riveting hammers, also manufactured by the Chicago company, and which the Pressed Steel Car Co. has had in



use for some time at its Allegheny shops, have proven so satisfactory that sixty more of them are to be put in at once. These hammers are used for riveting work in the manufacture of cars by the Pittsburg company. They have proven durable and rapid and have effected such a saving in labor as to greatly expedite the work and increase the productive capacity of the car company. Severe tests were made to determine the desirability of using these hammers. Mr. Charles Booth, manager of the Chicago company, says that the long-stroke hammers represent the greatest advance yet made in pneumatic tools, and orders for them are already taxing the manufacturing facilities of his company.

MODEST WRECKING MASTER.

R. P. Thompson of the Thompson Towing & Wrecking Association (now a part of the Great Lakes Towing Co.), who was in charge of the job of raising the steamer Douglass Houghton, when she tied up the Lake Superior fleet in the Sault river, has been very modest in referring to the successful outcome of that undertaking. He has been connected with towing and wrecking business for about ten years past. His first thought was to praise the divers when he said of the work recently:

"The divers employed to do the under-water work connected with his job—they are brothers, Isaac and Alexander Zess—deserve great credit, as they accomplished all that they set out to do without an error of any kind. An idea of what they accomplished may be gained from knowledge of the fact that the hole in the Houghton's side, 2 feet fore-and-aft and 7 feet up and down, was patched temporarily so that in thirty-six hours after she was sunk the steamer was enabled to pump the water out of her hold with her own two pumps. After the water was pumped out there was nothing left to do but to hurry the work of lightering ore from the wreck to our lighter. This was done in eighty-eight hours, counting from the time we began lightering until we had the steamer afloat in Mud lake. Then we took up the work of placing steel plates over the temporary patch which did not require very much time. The Houghton was sunk on Tuesday, Sept. 5, at 2:30 p. m.; on Sunday, Sept. 10, at 5 p. m. she was being towed to anchorage in Mud lake, and on Monday, Sept. 11, at noon she left under her own steam for Lake Erie, where the balance of her ore cargo was to be unloaded."

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

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In shipping circles generally the determination of President McKinley to again urge upon congress the authorization of a trans-Pacific cable will be heartily endorsed. The national survey just made shows that the route selected is entirely practicable. The idea of running a branch line from Guam to Yokohama will this year be suggested as a feature of the enterprise. This arises from the desire of the administration to make the cable a commercial success, although it is desired primarily for government use. The president appreciates that congress may deem it impolitic to have the cable constructed and maintained at the expense of the United States and should a private company be allowed to take up the enterprise this Yokohama line would be an important consideration. The work of laying a cable among the Philippine islands has been delayed by the mishap to the cables ship Hooker. The vessel will be temporarily repaired at Cavite and then sent to Hong Kong where she will be put in condition, as the military authorities desire the prompt establishment of the line.

Officers of the new Buffalo Dry Dock Co., which has been under formation for some time past, and which is to enlarge and improve the Mills plant at that port, have finally been announced. It is understood, of course, that Edward Smith of Brown & Co., Buffalo, and W. A. Prime of Chas. E. & W. F. Peck (insurance firm of New York and Chicago), have been the prime movers in this enterprise, which will undoubtedly prove successful. The officers are: President, Edward Smith of Brown & Co.; vice-president, James Ash, vessel owner; secretary and treasurer, Abner C. Adams, formerly of Hand & Johnson's tug line; general manager, Capt. John Johnson, formerly manager of Hand & Johnson's tug line and of the property of the Great Lakes Towing Co. at Buffalo. Capt. Johnson resigned the management of affairs of the tug consolidation to assume the management of the new corporation's business. The directors are R. R. Rhodes of Cleveland, E. D. Carter of Chicago, William A. Prime of New York, and James Ash, Abner C. Adams, Edward Smith and C. H. Donaldson of Buffalo.

Preliminary trials of the torpedo boat Talbot, recently fitted with oil fuel apparatus at the Norfolk navy yard, proved all that could reasonably be expected in consideration of the limited knowledge of the new fuel possessed by the crew and the stiffness of the recently installed apparatus. The boat went over the measured course at Hampton Roads and the lower Chesapeake and while the test was one for stability rather than speed, the 17-knot mark was passed.

Hereafter all coal shipments from Newport News, Va., to cities on the Atlantic coast will be made by the Chesapeake & Ohio railroad, which has taken up the business of the defunct Atlantic Transportation Co., and is already acquiring a fleet of steam colliers, schooners and barges. It is understood that the C. & O. Co. will also let the contract in the near future for a screw passenger steamer to replace the Louise on the line between Newport News and Norfolk.

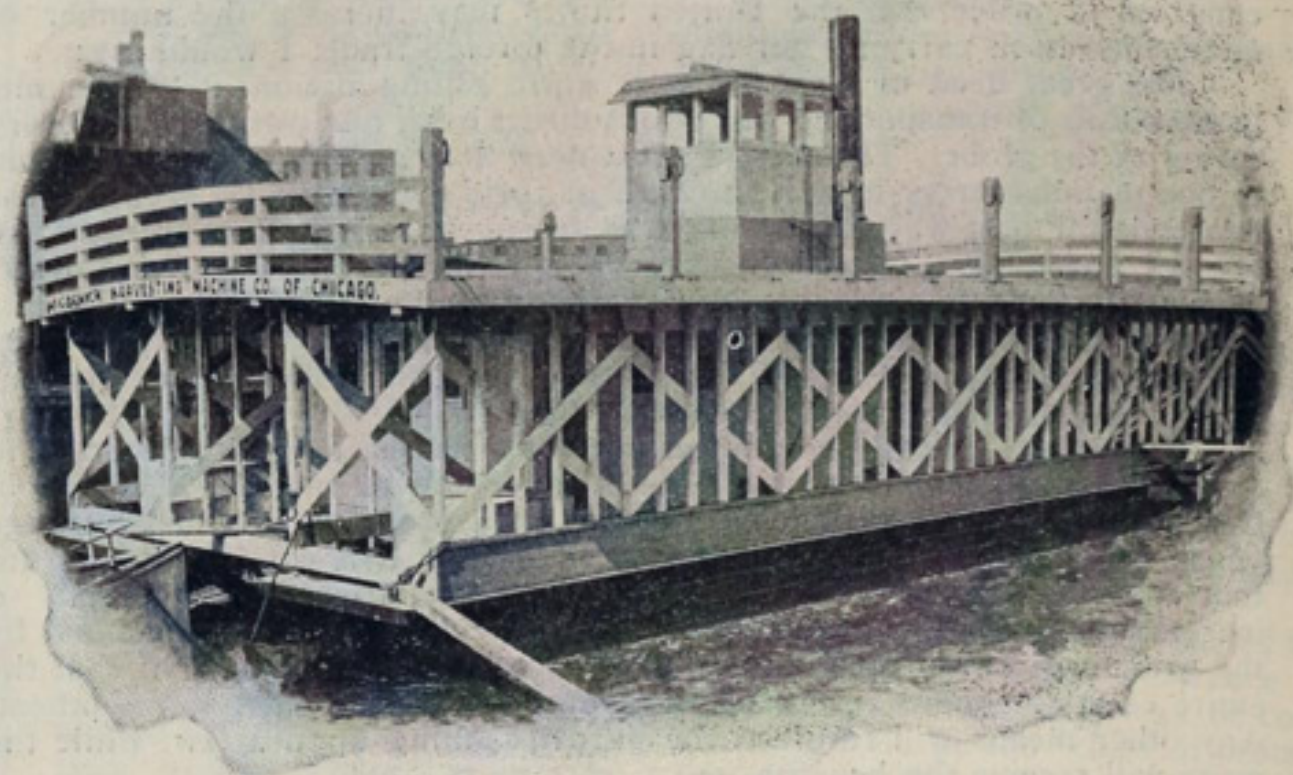
TRIAL OF THE BATTLESHIP KEARSARGE.

Fuller reports of the trial of the battleship Kearsarge, now available, bear out the favorable indications of the earlier records. The trial board consisted of Rear Admiral Rogers, Capt. R. D. Evans and Chief Engineer Charles R. Rollker. The builders, the Newport News Ship Building & Dry Dock Co., were represented by President C. B. Orcutt and Superintendent Walter Post. The trial was made over the sixty-six mile Cape Ann course off the Massachusetts coast. The showing made by the new battleship was a remarkable one, but it would, no doubt, have been even more remarkable had not a tube in the feed water heater burst, letting cold water into the boilers, with the result of running the steam down and thus decreasing the revolutions of the propellers eight turns per minute. The mishap reduced the speed of the ship nearly three quarters of a knot.

The starting line was crossed at 10:28:20. The ship kicked up considerable sea, but did not bury her nose to any extent and was making about 118 revolutions a minute. The light-house tender Lilac, the end of the first leg, was reached at 10:50:57, the elapsed time for the distance being 22 minutes 37½ seconds, or at the rate of 17½ knots. The light-house tender Mayflower, the end of the next leg, was reached at 11:13:34, with 22 minutes 37½ seconds again for the time, and the same rate of speed 17½ knots. The next leg, ending with the navy yard tug Potowse, was done in somewhat slower time, the buoy being reached at 11:36:44, with 23 minutes 10 seconds for the leg at the rate of speed 17.09 knots. A spurt was tried on the next leg and the battleship again leaped forward. The United States steamer Resolute at No. 5 buoy was reached at 11:59:49, with 23 minutes 4 seconds for the distance, and 17.16 knots for the speed. The last leg on the outward trip ending with the tug Layden off Cape Porpoise was finished at 12:22:38, with 22 minutes 49½ seconds for the leg and 17.35 knots for the speed. The thirty-three miles were done in 1 hour 54 minutes 19 seconds, with the average rate of speed 17.32 knots.

The Kearsarge continued on up the course for about three miles, made a short circle and was off again on the inward trip. The starting line was crossed at 12:46:18. No. 5 station was reached at 1:10:21 or in 24 minutes 3 seconds, speed 16.47 knots; No. 4 at 1:34:10½, interval 24 minutes 49½ seconds, speed 16.62 knots; No. 3 at 1:58:21½, interval 24 minutes

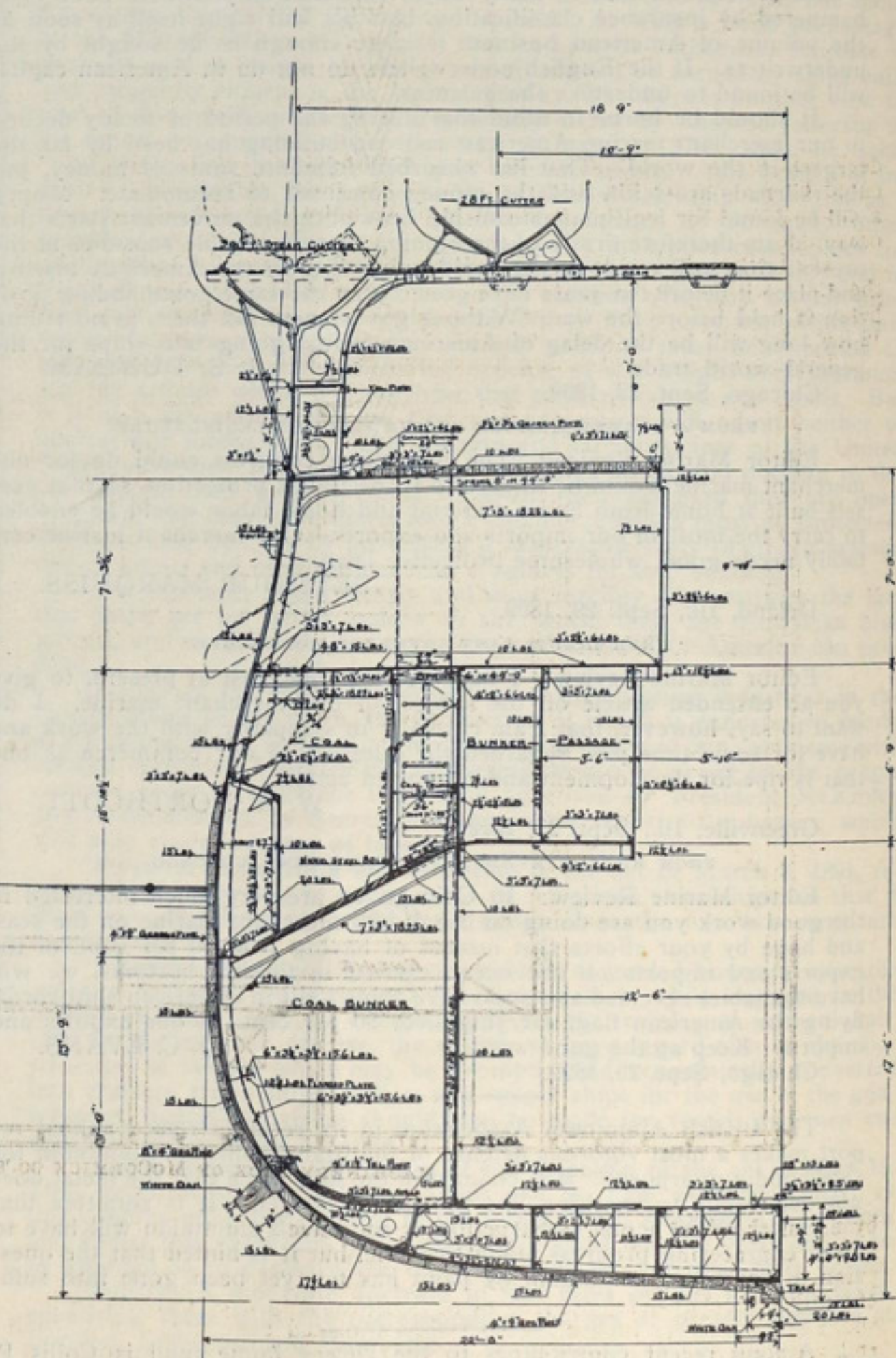
11 seconds, speed 16.37 knots; No. 2 at 2:22:59, interval 24 minutes 37½ seconds, speed 16.08 knots, and the finish at 2:47:15, interval 24 minutes 15 seconds, speed 16.33. The inward trip was done in 2 hours 1 minute 2 seconds; average 16.37 knots. The total time for the sixty-six miles was 3 hours 55 minutes 21 seconds, and the average speed for entire distance 16.84 knots. The members of the trial board expressed themselves as very much pleased with the ship. Capt. Evans's comment was: "She



NOVEL TYPE OF FERRY BOAT FOR CHICAGO RIVER.

is a magnificent ship, and I believe she can do better than 17 knots."

President Orcutt, of the ship building company, said: "I can say that I am very well satisfied with the run, all things considered. This ship is the first United States naval vessel to make her trial trip with practically her entire armament on board. She made wonderful time on



SECTIONAL PLAN OF THE NEW UNITED STATES CRUISER OF THE DENVER CLASS.

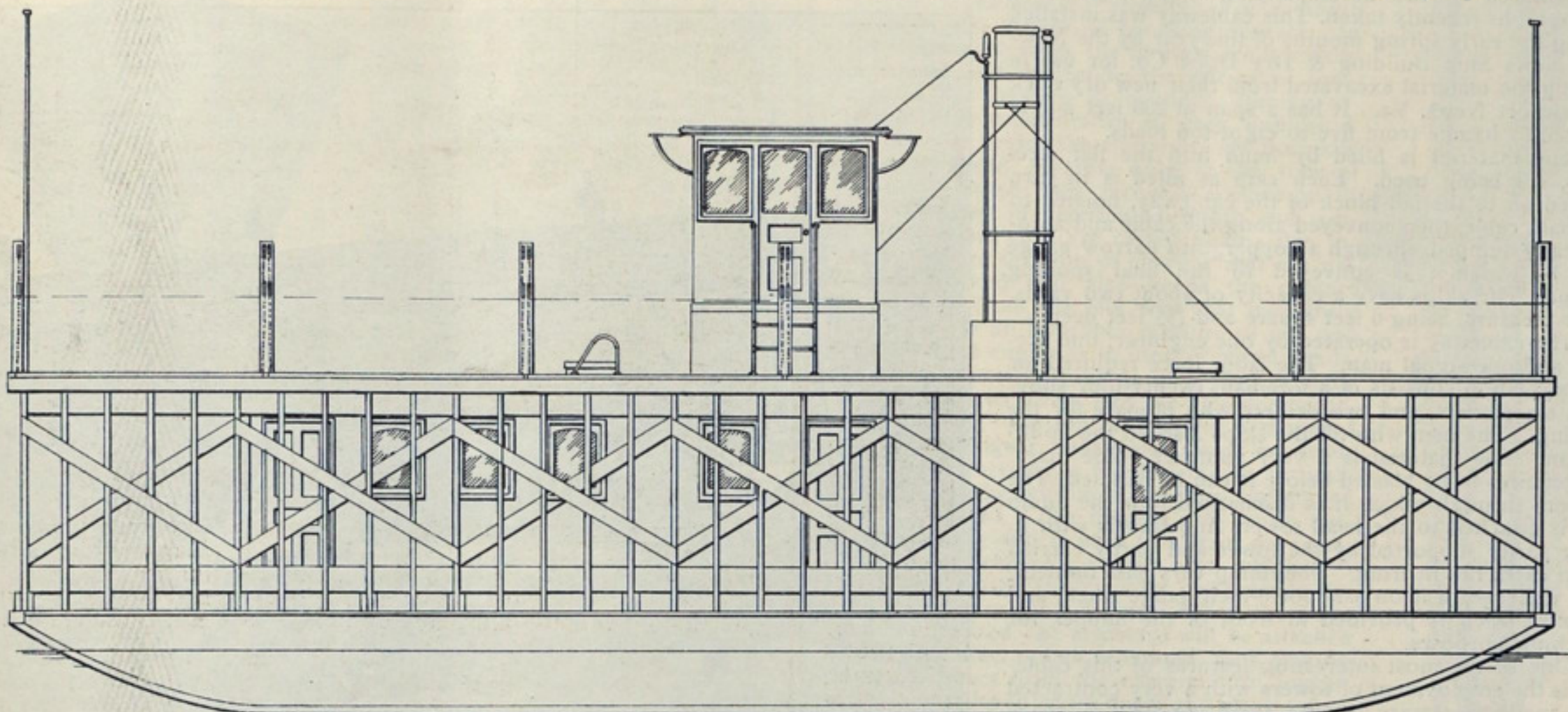
the up trip and if the conditions had been equally good on the return, I am confident she would have done as well. Her engines worked beautifully, she was steady and with no perceptible vibration, and although the firemen were hardly up to the usual standard, the crew as a whole was a good one. I have not the slightest hesitation in saying that I am confident she can do 17¼ knots at least under favorable conditions."

NEW FERRY BOAT ON THE CHICAGO RIVER.

The McCormick Harvesting Machine Co. some time ago decided that it was necessary to have increased facilities for the transportation of material between their buildings on each side of the river. They applied to the city authorities for permission to build a bridge and were refused. Then they decided to have a boat that should run diagonally across the river for 1,500 feet and receive and discharge its load from docks 11 feet 6 inches above the water line. The contract was offered to a number of builders, who at once declared it to be impracticable to carry the load so high. The problem was solved, however, by the Marine Iron Works, and their ideas were indorsed and the order given at once. The height of the load

EDWARD SEWALL.

This fine vessel is the largest steel sailing ship ever built in the United States, and is the fourth steel vessel built by Arthur Sewall & Co., ship builders and ship owners of Bath, Me. She was launched Tuesday, Oct. 3, with her hull practically completed and all her masts and lower rigging in position. She is a fine, staunch vessel and she will receive the highest rating in both the Bureau Veritas and in one of the best of the home registers. The principal dimensions of the new vessel are: length over all, hull, 355 feet; length L. W. L., 332 feet; beam, 45 feet; depth, 28 feet; draught, 23 feet; gross tonnage, 3,300 tons; net tonnage, 3,000 tons. The Edward Sewall is a two-decked vessel with poop and forecabin.



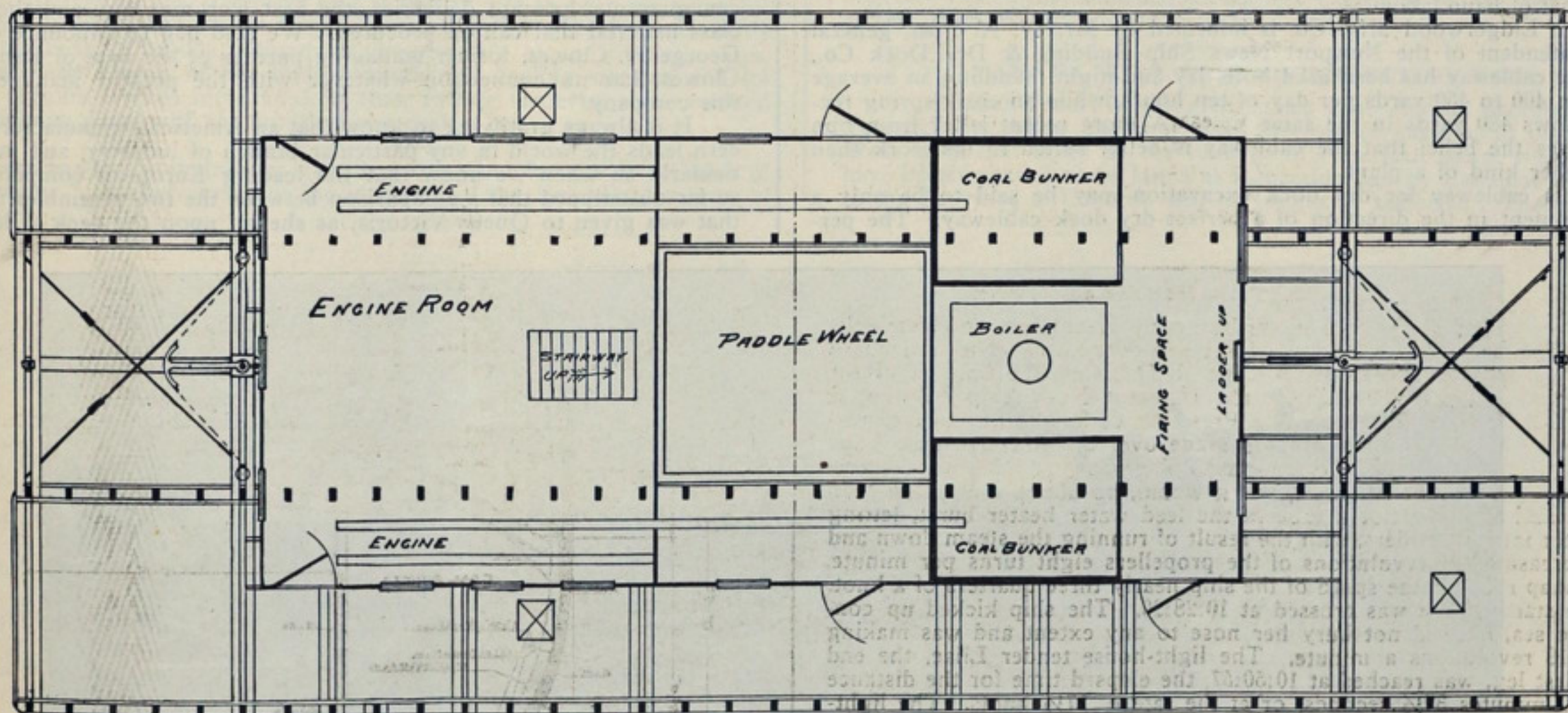
OUTBOARD PLAN OF CHICAGO RIVER FERRY BOAT WITH HIGH LOAD LINE.

deck was taken advantage of to use a paddle-wheel and the stability secured by placing all the displacement at the sides. The natural result is a catamaran with central paddle-wheel, as shown in the accompanying drawings.

The freight deck is 60 by 30 feet; freight to be loaded on and off from the sides without turning the boat. The length of each hull is 60 feet; beam of each hull at water line 9 feet; distance between hulls in the clear 12 feet; draught when ready for load $2\frac{1}{2}$ feet.

There are two direct-acting horizontal paddle-wheel engines, each $7\frac{1}{2}$

and two deck houses for the crew and donkey boiler. She is shipentine rigged. Her lower masts and top masts are of steel, each in one piece, which measure 110 feet above deck. The topgallant and royal masts are 75 feet long. The lower yards are 95 feet long, the topsail yards 85 feet, and the upper topsail yards 78 feet long. The topgallant yards measure 65 feet, the royal 55 feet and the skysail 45 feet. She has six yards on each of the fore, main and mizzen masts, and she carries no yards on the jigger mast. She carries 34 sails, all told. Her complement will consist of 37 men, all told, and she will cost about \$160,000. William A. Fairburn,



MACHINERY DECK OF MCCORMICK CO.'S FERRY BOAT FOR CHICAGO RIVER SERVICE.

by 28, of the double-ported balanced piston valve type and one Roberts water tube boiler (Marine Iron Works, builders). The licensed steam pressure is 250 pounds; heating surface in boiler 500 square feet; diameter of paddle-wheel 10 feet; number of buckets 12; length of buckets 10 feet; width of buckets 12 inches. Two rudders, placed centrally, one at each end, are rigged so that both are constantly in use and are handled by one wheel, so that the boat is steered from both ends at once. The main throttle valve and reversing lever of the engines are on the ceiling, above the boiler, in the boiler room, the wheel house also being directly above this room. The object is to allow two men to handle the boat. Water for steaming is carried in galvanized tanks at the ends of the boat. Hinged aprons on each side form the rail or guard when the boat is under way and serve as gangways while loading and unloading. The boat has been inspected and is satisfactory to her owners.

naval architect of Bath, and chief draughtsman at the Bath Iron Works, made the plans for this vessel.

The Electric Boat Co., incorporated some time ago under the laws of the state of New Jersey and which absorbed the Holland Torpedo Boat Co. and the Electric Launch Co., has some ambitious plans. The first work of the company will be the construction of a heavy ferry boat, operated by a storage battery, which will be experimented with in the harbors of New York and Philadelphia. Other craft for short distance service will also receive attention.

Bids recently opened for supplying the navy department with ordnance included propositions from the Midvale Steel Co., the Carpenter Steel Co. and the Firth Sterling Steel Co.

CRANE FOR DOCK CONSTRUCTION.

LIDGERWOOD MACHINERY BEING USED IN THE CONSTRUCTION OF THE LARGE DRY DOCK AT NEWPORT NEWS.

The Lidgerwood traveling cableway was first employed on the Chicago drainage canal, and while it was found to be the most economical hoisting and conveying machine for that work, it has been vastly improved by the manufacturers, the Lidgerwood Mfg. Co., New York, in later installations. An interesting example of the use of this machinery is illustrated by the accompanying engravings from photographs recently taken. This cableway was installed during the early spring months of this year by the Newport News Ship Building & Dry Dock Co. for use in moving the material excavated from their new dry dock at Newport News, Va. It has a span of 233 feet and is adapted to handle from five to eight-ton loads.

The material is filled by hand into the flat steel skips, six being used. Each skip as filled is in turn hooked on to the fall block of the cableway, hoisted to the main cable, then conveyed along the cable and automatically dumped, through a hopper, into narrow-gauge cars, by which it is conveyed to the final spoiling ground. The skips have a capacity of about two yards, water measure, being 6 feet square and 1½ feet deep.

The cableway is operated by one engineer, one fireman, and one signal man. The labor force required for the excavation consists of a foreman, twenty-four shovellers, six pickers, and two drillers who prepare for the blasting. The men who fill the skips also do the hooking on. The material is a very compact "blue marl" and requires to be blasted before it can be handled. The hopper through which it is discharged into the dump cars is attached to the head towers and travels with it, being partly supported by the tower and partly carried on an extra rail in front. The dump cars pass immediately underneath it on a 2-foot 6-inch gauge track, and an extra track is provided in front of the hopper for switching purposes.

One of the most interesting features of this cableway is the employment of towers with a very contracted base, made necessary by the small amount of space available for them. These towers are built of heavy timber and are exceedingly strong and substantial for carrying the machinery, cables and ballast, and each travels on five rails, or an arrangement which is equivalent to three standard railroad tracks.

The engine for operating is contained within the head tower, and is of the standard Lidgerwood type, especially adapted for this class of work. The carriage and loaded skip approaching the hopper are very clearly shown in Fig. 2, also the rough character of the excavation, composed of hard clay filled with piles. The local conditions made it impossible to handle the material by any other method than that of hand labor.

The Lidgerwood Mfg. Co. is informed by Mr. W. A. Post, general superintendent of the Newport News Ship Building & Dry Dock Co., that the cableway has been used both day and night, handling an average of from 400 to 450 yards per day of ten hours, while an early spring record shows 480 yards in the same time. A more recent letter from him expresses the belief that the cableway is better suited to his work than any other kind of a plant.

This cableway for dry dock excavation may be said to be only a development in the direction of a perfect dry dock cableway. The per-

the greatest interest to the American people at the present time. The Lidgerwood Co. has just received a duplicate order for a cableway from the Newport News Ship Building & Dry Dock Co.

SEAMLESS BRASS TUBING.

The following announcement, received recently from Waterbury, Conn., is self-explanatory: "We take pleasure in announcing to our friends, patrons, and the trade in general, that the plant, properties and all the interests of the firm of Randolph & Clowes have been purchased by the corporation Randolph-Clowes Co. With ample working capital, man-

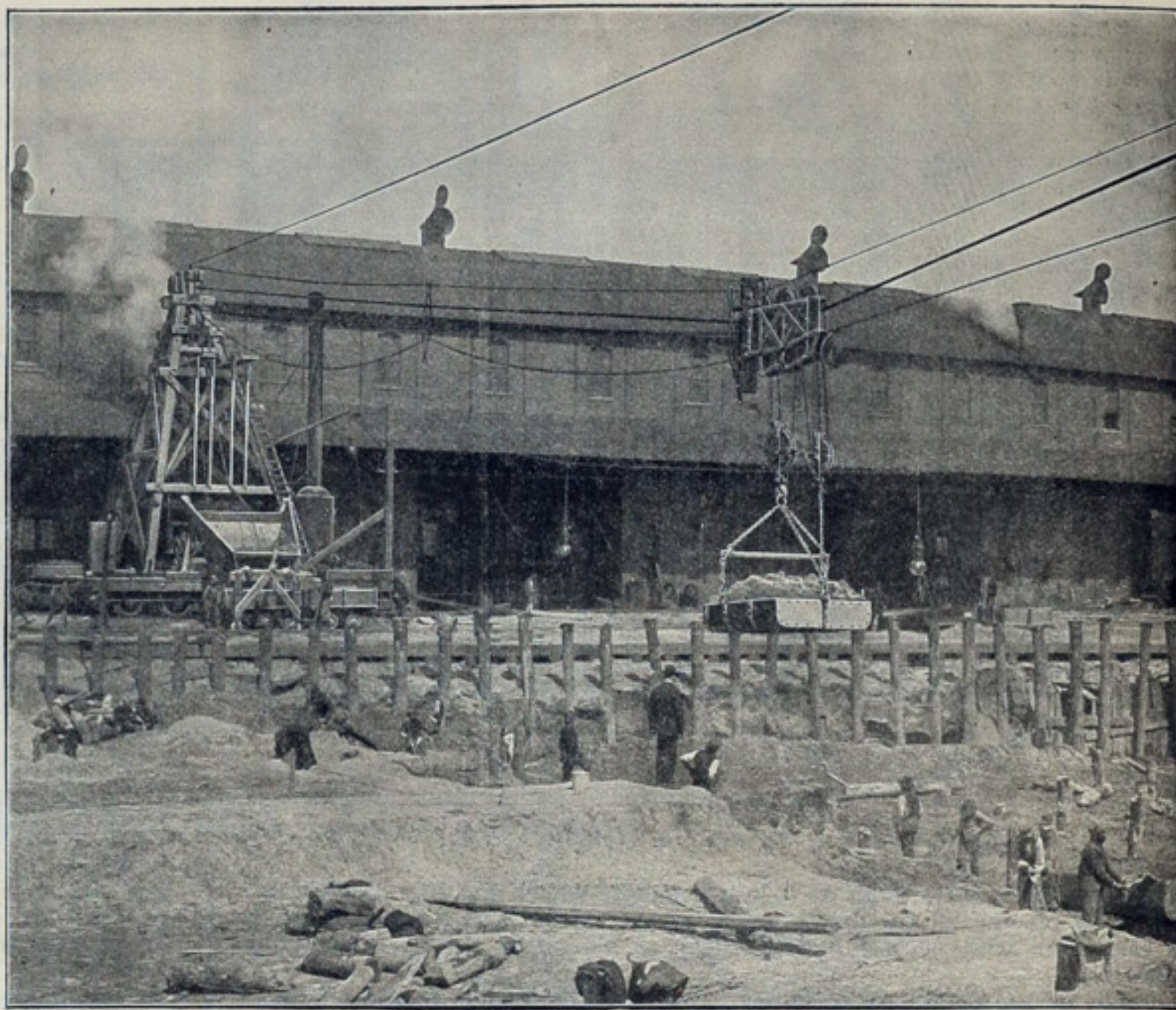


FIG. 2. CARRIAGE AND LOADED SKIP, LIDGERWOOD CABLEWAY, NEWPORT NEWS, VA.

aged by men of long and successful experience in the brass business, we can guarantee prompt deliveries, the best workmanship, and the highest class material that can be procured. We also beg to announce that Mr. George H. Clowes, former managing partner of the firm of Randolph & Clowes, has no connection whatever with the present management of this company."

It is always gratifying to know that an American manufacturing concern leads the world in any particular branch of industry, and more particularly so when we know that the leading European competitors are so far outstripped that a comparison between the two resembles the reply that was given to Queen Victoria, as she sat upon the deck of her yacht

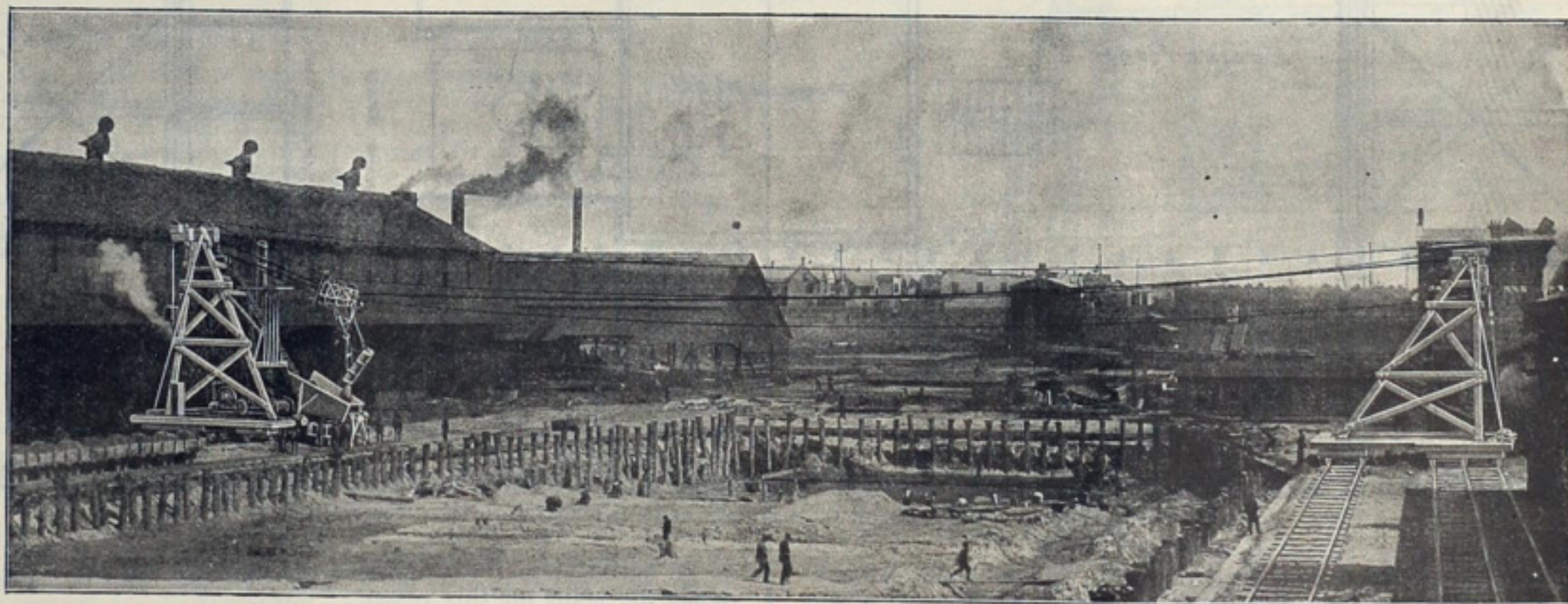


FIG. 1. GENERAL VIEW, LIDGERWOOD CABLEWAY EXCAVATING DRY DOCK AT NEWPORT NEWS, VA.

fect plant should be arranged with two independent cables and systems of ropes supported by a single pair of towers with an operating engine on each tower, each engine controlling one of the cableway systems and each cableway handling a self-filling and self-dumping "orange peel" bucket, by means of which the labor in the excavation may be done away with and the digging capacity doubles with one set of towers and tracks. Such a cableway is illustrated in Fig. 3. The adaption of the Lidgerwood traveling cableway as described opens the way to a new and a cheaper method of building dry docks, the construction of which is of

at Cowes, and asked what yacht was second to the America, just then coming into sight as winner of the most famous of all world's yacht races: "Your Majesty, there is no second." And when it comes to the question of the manufacture of seamless brass tubing the same reply can well be given, for to America belongs the victory. The Randolph-Clowes Co. of Waterbury, Conn., manufactures seamless brass and copper tubes in all diameters from ⅜ inch up to monster tubes 38 inches in diameter. The largest tubes manufactured in Europe commercially are from 12 to 14 inches in diameter, while of their

American competitors, one firm has recently put in machinery for manufacturing $9\frac{1}{2}$ inch tubes and only one or two others make up to 8 inch diameters, while the rest content themselves with modest sizes of 3 or 4 inches. Besides seamless tubing, the Randolph-Clowes Co. manufactures sheet brass and copper, as well as the well known Brown's seamless copper range boilers and other plumbing specialties.

THE STURTEVANT EXHAUST HEAD.

As indicated by the illustration, this exhaust head, built by the B. F. Sturtevant Co., Boston, Mass., is designed to separate by the utilization of centrifugal force. The head is attached directly to the end of the exhaust pipe from which the steam passes up to the branch pipes and is discharged tangentially within the case. It is thus given a vigorous whirling motion and the entrained water—likewise the oil—is thrown outward with great force, strikes the cool sides and trickles down to the outlet at the bottom. The steam now perfectly dry, finds ready escape through the central opening above. As water weighs nearly 1,600 times as much as exhaust steam, and as centrifugal force is proportional to the weights of the bodies in motion, it is evident that the force acting upon the water is nearly 1,600 times that exerted upon the steam, and that the action is both positive and absolute.

These heads are built in sizes to fit pipes from 1 inch to 20 inches, all sizes above 10 inches being flanged. The case and pipes are of heavy galvanized iron, 16 to 20-gauge according to size, all external joints are riveted and soldered, and the internal pipes are double-braced.

COALING VESSELS AT SEA.

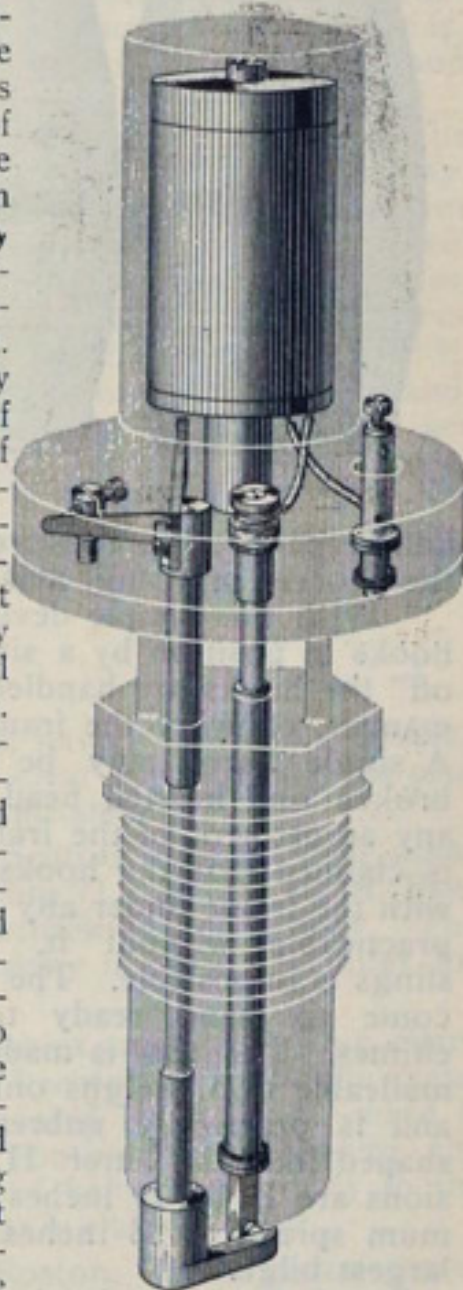
Great interest has been aroused in the official test soon to be made by the navy department of the Lidgerwood device for coaling at sea, which has been fitted on the collier Marcellus under the direction of Naval Constructor Francis T. Bowles. Preliminary to the trial at sea, tests will be made in the dock to drill each man perfectly in the station he is to occupy in operating the apparatus at sea. Should the apparatus prove as successful as everything would seem to indicate the United States will have solved a problem that has been puzzling all the more progressive nations of the earth for a number of years. How vital this is considered in naval strategic estimates is well evidenced by the desperate efforts to coal ships at sea made during the recent maneuvers in the Mediterranean. In these attempts risks were incurred which would hardly be taken in time of actual and extreme emergency due to the necessities of war. Even under these circumstances the attempt was not what might be called highly successful. The collier which was used for the experiment nearly crushed the side of one warship and was itself so badly damaged in a second attempt to coal a cruiser that it had to run to port for extensive repairs. It was found almost impossible to hold the warships sufficiently near the coaling vessels without risking the loss of one or both ships. Germany, by reason of her limited number of coaling stations and for other reasons, is even more anxious than France to devise some method of supplying ships with ammunition and coal at sea.

Very handsome invitations have been sent out for the celebration of the seventy-fifth anniversary of the founding of the Franklin Institute of

NEW ELECTRIC IGNITER FOR GAS ENGINES.

There is illustrated herewith an electric igniter for gas engines that has received very favorable comment from parties who are familiar with the difficulties usually encountered in this class of machinery. It is radically new in design, as it makes use of the well-known induction of electromagnets to produce a spark or a succession of sparks of any desired length and temperature, thereby securing the prompt ignition of any charge, notwithstanding any probable causes of failure that may be able to affect the working of the usual igniters on the market, which depend on strength of current alone for the production of a single spark at the instant of breaking contact. In the ordinary devices, the igniters are normally separated and subject to the effects of ignition in the chamber or cylinder, coming together only momentarily at each explosion. In the new device the electrodes are normally in contact and separate only at the time of sparking, when they throw a succession of sparks of any predetermined length and temperature until they are closed again; this insures prompt ignition of charges that are unequally mixed and also keeps the contact points free from the oily soot that frequently results from an improper mixture of gas and air when the engine is in inexperienced hands.

The apparatus consists of a plug of sufficient length to screw into the cylinder or firing chamber. On top of this plug is mounted an electromagnet, connected with an insulated post carrying a fixed electrode projecting beyond the bottom of the plug and tipped with platinum. The magnet core ends outside the plug and is used to attract an armature on the end of a rocker arm, which also extends through the cylinder and carries the other platinum contact point. When the magnet is energized, the armature will be attached and the contact points separated, thus making a spark direct from the current. An instant later the induced spark from the electromagnets follows. When the current is broken the armature is retracted by a spring and the contact points close. The rocker arm is packed with powdered graphite, making a joint that is self-lubricating and gas-tight. The usual methods of wiring are not followed, as less battery may be used, the current returning through the engine as a ground. A cam on the engine makes and breaks contact to operate the magnets and the inventors prefer the use of a magneto on the engine and driven by it, as it is cheaper, more positive than battery and more easily kept in order, while the independence of ratio between spark and current allows the use of weak currents for heavy sparks. A shunt and push button allows the use of the igniter by hand when starting large engines. The igniter may be attached to any engine. For further information address Cotton & Kunze, 185 Dearborn street, Chicago.



CANADA WILL REFUND INSPECTION FEES.

A dispatch from Washington states that Acting Secretary of the Treasury Spaulding has informed collectors of customs at ports on the great lakes that taxes on the tonnage of American steam vessels, which have been imposed since Jan. 1 as inspection fees by Canadian authorities in the Province of Ontario, will no longer be collected. These so-called

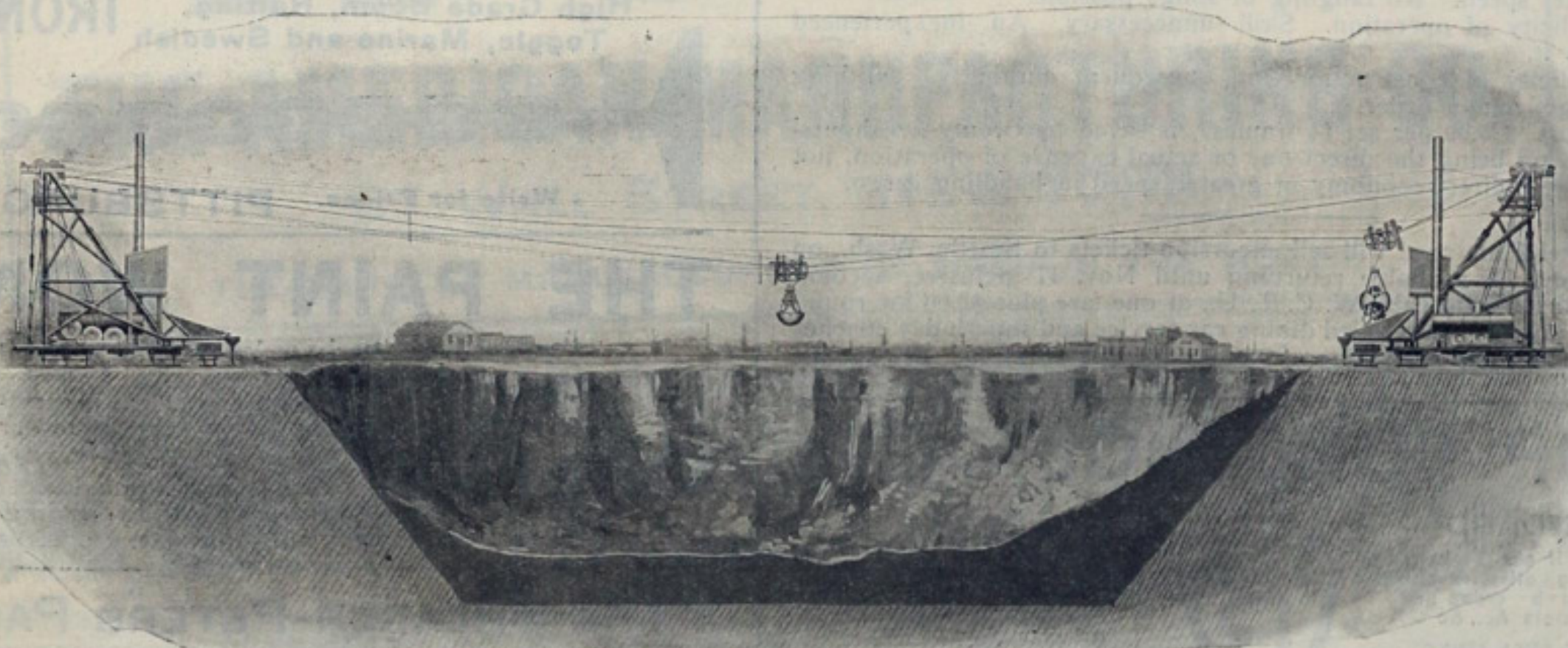


FIG. 3. PERFECTED FORM OF LIDGERWOOD CABLEWAY FOR DRY DOCK EXCAVATION.

Philadelphia. The celebration, which is being held in the convention hall of the national export exposition, will extend over to Saturday of this week, upon which date Rear Admiral Melville will read a paper entitled "The Modern Warship as Combining in Itself the Highest Results of Skill, Ingenuity and Scientific Knowledge."

A report sent out from Washington is to the effect that plans are being prepared for the installation of a full war battery on all the new revenue cutters, so that they will be available for immediate war service.

inspection fees were in contradiction of the agreement by which Canadian vessels entering the United States from Ontario are exempt from tonnage taxes. The governor-general of Canada telegraphed that the Ontario officials have erroneously construed the Canadian steamboat act, and that orders have been issued for a refund of fees paid by American vessels since Jan. 1.

Capt. C. A. F. Flagler, army engineer at Montgomery, Ala., will open bids Nov. 3 for the construction of two dipper dredges.

THE "SLING FRAME."

A barrel cargo can be handled from the hold of a ship to dock or vice versa only as fast as the barrels can be elevated or lowered through the hatches. The greatest loss of time and consequent useless expense has

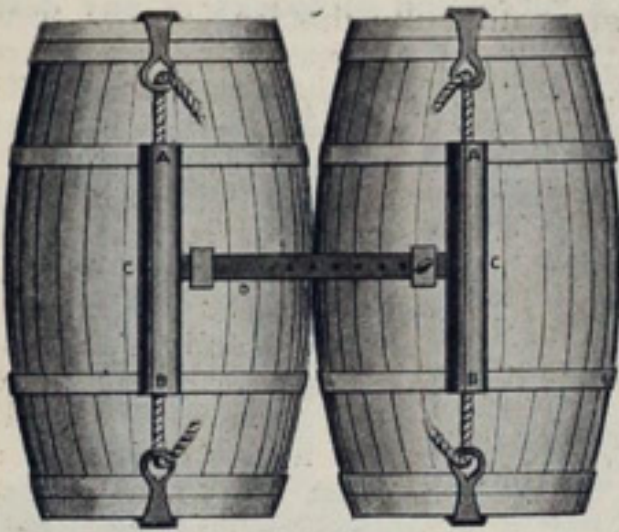


FIG. 1.

been directly chargeable to the unhandiness of the hooks and slings. The tendency of the latter to tangle when "cast off" and the necessity of employing two men to place the hooks in position in "striking down" are the chief reasons for complaint. To overcome these difficulties many "patent hooks" have been devised and proved impracticable in actual test. What they failed to accomplish has been performed by a simple device invented and patented by H. R. Patriarche of Milwaukee. It is known as a "sling frame," and is unique in the fact that although it rests in the slings

and keeps them spread, preventing tangling, it bears no strain whatever in the process of lifting, and may be moved easily when pendant is taut.

With this simple device it is possible for one man to place all four hooks in position by a single motion of the right hand, and in "casting off" the hooks are handled in the usual manner, carrying the frame with them. A single barrel may be handled or a broken one hoisted head first without any adjustment of the frame; in fact, it is claimed that the hooks can be used with the frame under any circumstances practicable without it. Tangling of slings is impossible. The hooks always come to hand ready to drop over chimes. The tool is made of the best malleable iron, weighs only six pounds and is practically unbreakable. It is shaped like the letter H. Its dimensions are 12 by 14 inches with a maximum spread of 28 inches to cover the largest bilge.

Fig. 1 shows the hook in place. The arms C C are tubular and the slings pass through them, the hooks hanging at the corners of frame A A and B B. In using the device the slings are held up with the left hand while the right grasps the center bar D (see Fig. 2). The hooks at the ends A A are dropped over chimes; the frame is then drawn back until the after hooks also engage and the operation is complete. To change from one sized barrel to another all that is required is to draw a pin in the cross bar D, increase or diminish spread as desired, and replace pin.

The arms C C being much shorter than the length of a barrel and moving freely on slings, do not assume any strain, but allow the hooks and slings perfect freedom. When hooks are in place, the ends of frame A A and B B are at least 2 inches clear of them (see illustration), and when barrels are raised the frame may be moved backward and forward with the hand, showing no interference whatever. Advantages claimed by the inventor should make this simple device a standard article. They are:

1. The saving of two men at each hatch in loading, or one man wherever hooks are used.
2. Greater speed. No tangling of slings possible.
3. Simplicity of operation. Skill unnecessary. An inexperienced man can use it.
4. Simplicity of construction and consequent durability. Nothing to break or get out of order.
5. Its cost, \$25.00 per set (4 frames), is saved by twenty-five hours' work, this saving being the direct one of actual expense of operation, not to mention the indirect economy of greater speed in handling cargo.

The Nickel Plate road will sell excursion tickets to Seattle, Wash., on Oct. 12, 13 and 14, available returning until Nov. 17 inclusive, account the annual convention of the W. C. T. U., at one fare plus \$2.00 for round trip. Palace sleepers, unexcelled dining car service and superb day coaches make the Nickel Plate road a favorite route for this occasion. See agents.

DROP FORGINGS TO ORDER

STANDARD

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U. S. ENGINEER OFFICE, Montgomery, Ala., October 2nd, 1899. Sealed proposals for building two dipper dredges will be received here until 12 O'Clock, November 3rd, 1899, and then publicly opened. Information furnished on application to C. A. F. FLAGLER, Capt., Engineers. Oct. 26

THE NEW STEAM YACHT VIRGINIA.

This handsome vessel, which is the fifth yacht built by the Bath Iron Works, was successfully launched Tuesday, Sept. 19, from the yard of her builders at Bath, Me. She was christened by Miss Stern, the daughter of Isaac Stern of New York, the vessel's proud owner. This fine vessel is being built from a model and sketch plan furnished by Geo. L. Watson & Co. of Glasgow, Scotland, but the builders have changed the plans and prepared their own specifications. They have worked up the design of this vessel under the supervision of the owner's representative, Mr. J. Frederic Tams of the firm of Tams & Lenoire of New York city.

The Virginia is 200 feet long over all, 165 feet on the water, 26 feet beam, 16 feet deep and 12 feet draught. A triple expansion engine furnished with steam by a Scotch boiler will drive her through the water at a speed of 14 knots under forced draft and 12 knots under natural draft. The cylinders are 16, 26 and 41 inches diameter, respectively, the stroke being 27 inches. The designed I. H. P. is 1,100.

The spars of the yacht will be lofty with a pleasing rake. She will undoubtedly be a handsome, seaworthy vessel, staunchly built and with luxurious accommodations and excellent appointments. The Bath Iron Works have the reputation of doing excellent yacht work and they are well known as the builders of the Aphrodite, which is unanimously proclaimed by all who have seen her to be the queen of American pleasure craft.

An effort is being made by Capt. Geo. P. McKay of the Lake Carriers' Association to have the United States light-house board move Simmons' reef light-vessel from its present position in the Straits of Mackinaw to the new spot in Lansing shoal vicinity on which the Lansing shoal gas buoy is now located, and to have the Lansing shoal buoy replace the light-ship. The Straits are now quite well lighted in the vicinity of Simmons' reef and the light-ship could be spared from that place if replaced by a gas buoy. Lansing shoal is a turning place, and it is therefor claimed that the fog signal on the light-ship would prove highly valuable at that point. It is understood that Commander F. M. Symonds of Chicago, who is in charge of the Lake Michigan light-house district, favors the change, but an act of congress may be required in the matter.

Statistics of merchant vessels built in the United States during three months ending Sept. 30, as given out by the bureau of navigation, treasury department, show that new wooden vessels aggregated but 6,951 tons, against 25,113 tons for the corresponding three months of last year, but the new steel tonnage was 47,043, against 33,462 for the corresponding months of 1898. Of the total new tonnage, two-thirds was built on the great lakes. The construction of wooden vessels is, of course, on the decline. A new wooden ship will be a novelty after a few years. The showing as to steel vessels is probably not up to expectations, but the increases in this line from ship yards in various parts of the country will not come until the first quarter of next year, when the rush that now prevails will have resulted in the new ships being placed in commission.

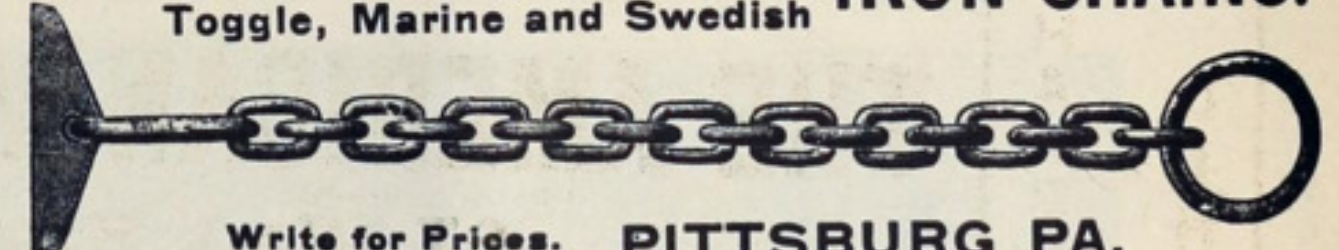
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Quotations furnished by HERBERT WRIGHT & Co., Cleveland,
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NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	48 1/8	49 1/2	48 1/8	49
American Steel & Wire, Pfd.....	94	94 3/8	94	94
Federal Steel ..	53	53 1/2	52 3/4	53 1/2
Federal Steel, Pfd.....	77 3/8	78	77 1/2	78
National Steel ..	51	51	50	50 1/2
National Steel, Pfd*.....	.....	.....	.....	.....
American Tin Plate ..	38	.....	.....	38
American Tin Plate, Pfd.....	85	.....	.....	85
American Steel Hoop.....	41 3/8	43	40 3/4	43
American Steel Hoop, Pfd.....	85	85	84	84 1/8
Republic Iron & Steel.....	26 1/2	26 1/2	26	26 1/4
Republic Iron & Steel, Pfd.....	.....	.....	.....	.....

* Ex. Dividend, 1 1/4 per cent.

Announcement is made from Glasgow that the Clydebank Ship Building Co. has received a contract for the construction of a steamer 15 feet longer than the Oceanic for the Cunard line. The new vessel will be ready to go into commission in the spring of 1900. The Clydebank company has built no swift ocean steamers since the Paris was launched in 1888.

According to estimates submitted to the navy department fully \$2,000,000 will be required for overhauling and repairing of ships that participated in the battle of Manila bay. The Boston and Raleigh will each necessitate an expenditure of half a million to put them in fighting trim and the expenditure on the Baltimore will be even heavier.

The Review presents on another page a sectional plan drawing of the new cruisers of the Denver class for the United States navy. There has been more or less controversy regarding the proposed speed and armament of these vessels but naval architects seem agreed that in structural detail they are well nigh faultless.

VANDUZEN'S STEAM-JET PUMP.

This pump has no moving parts and is operated independently of any engine or motive power. It has no mechanical arrangement to absorb power, requires no oil packing or special care, and is therefore absolutely reliable. It is certain to start as soon as steam is turned on and will continue to work as long as steam and water are supplied. This pump is light weight, small, portable and quickly removed from place to place. Requires no skill to set it up or take it down. Send for catalogue 82 to E. W. Van Duzen Co., Cincinnati.

PARAGON BOILERS.

Boilermakers all over the country have been for some time past experiencing the same difficulty in securing steel that is complained of in all other manufacturing lines. Capt. M. DePuy of No. 19 South street, New York, inventor of the Paragon type of boiler, writes that he could load up with orders for boilers for tugs, yachts, western river steamers and various other craft but for the great difficulty that he finds in securing material and in making contracts with boiler manufacturers, on account of the rush of work that is going on in these establishments. He is, however, gradually getting around to the point of caring for the demand that has sprung up for this boiler.

"Paragon boilers have been in use just one year this month," he writes, "and although they have been worked constantly night and day, we have yet to hear a complaint regarding them. My highest expectations as regards durability and saving of fuel have been exceeded. Capt. Geo. Noyes, who is half owner of the steamer Paragon, using this type of boiler, and who is also captain of the steamer Silex, says that the Silex burns forty-eight tons of soft coal per month, which at \$2.75 a ton costs \$132, or a total fuel bill for the year of \$1,584. The Paragon on the other hand, burns only twenty tons of coal per month, which at the same price per ton would involve a fuel bill for a year of \$660, or \$924 less than that of the Silex."

The Paragon boiler may be adapted to every place where steam boilers are used on land or water, but it is best adapted for tugs and yachts and for western river service.

TRADE NOTES.

The B. F. Sturtevant Co. of Boston, Mass., have just issued a circular relating to their exhaust heads, which makes clear the efficiency of centrifugal force as a means of separating water and steam.

The Phillips Co., manufacturers of lubricating devices and other machinery supplies, has removed its factory from 71 Sudbury street, Boston, to 257 Atlantic avenue in a building overlooking the harbor. The commodious offices and factory give the company increased facilities for turning out its excellent specialties.

On account of the demand for it on steamships and yachts, ship chandlers everywhere throughout the country are keeping in stock the metal polish known as "Brilliant," which is manufactured by H. B. Leonard & Co. of Somerset, Mass. This company is continually increasing the amount of its polish on the market, the demand being due largely to the fact that they guarantee the polish to do all that is claimed for it.

George W. Knowlton, 73 Broad street, Boston, Mass., manufacturer of mechanical rubber goods, had on exhibition at the convention of the National Association of Stationary Engineers at St. Louis, three rings of his moulded packing that had run over 16,000 miles under 165 pounds steam pressure (high pressure rod) on the steamer Admiral Farragut of the Boston Fruit Co.'s line, Boston to Jamaica. The rings were still soft and in perfect condition.

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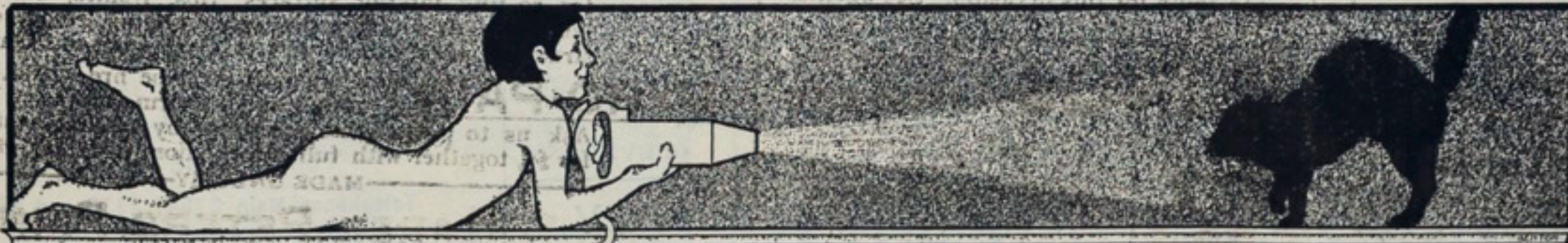
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U. S. Engineer Office, Milwaukee, Wis. Sept. 20, 1899. Sealed proposals for building Crib Breakwater at Sheboygan Harbor, Wis., will be received here until 12 o'clock noon, standard time, Oct. 24, 1899, and then publicly opened. Information furnished on application. J. G. Warren, Capt., Engrs. Oct. 19.

U. S. Engineer Office, Galveston, Tex. Sept. 25, 1899. Sealed bids, in triplicate, for Improving Aransas Pass, Tex., by removing old jetty and dredging, will be received until 2 p.m. Oct. 25, 1899, and then publicly opened. For information apply to C. S. Riche, Capt., Engrs. Oct. 19.

SEALED PROPOSALS will be received at the office of the Light House Engineer, Tompkinsville, N. Y., until 12 o'clock M., Oct. 9th, 1899, and then opened, for the sale of a steamer to be used as a Light House Tender. For information apply to D. P. HEAP, Lieut. Colonel, Corps of Engineers, U. S. A. Oct. 5

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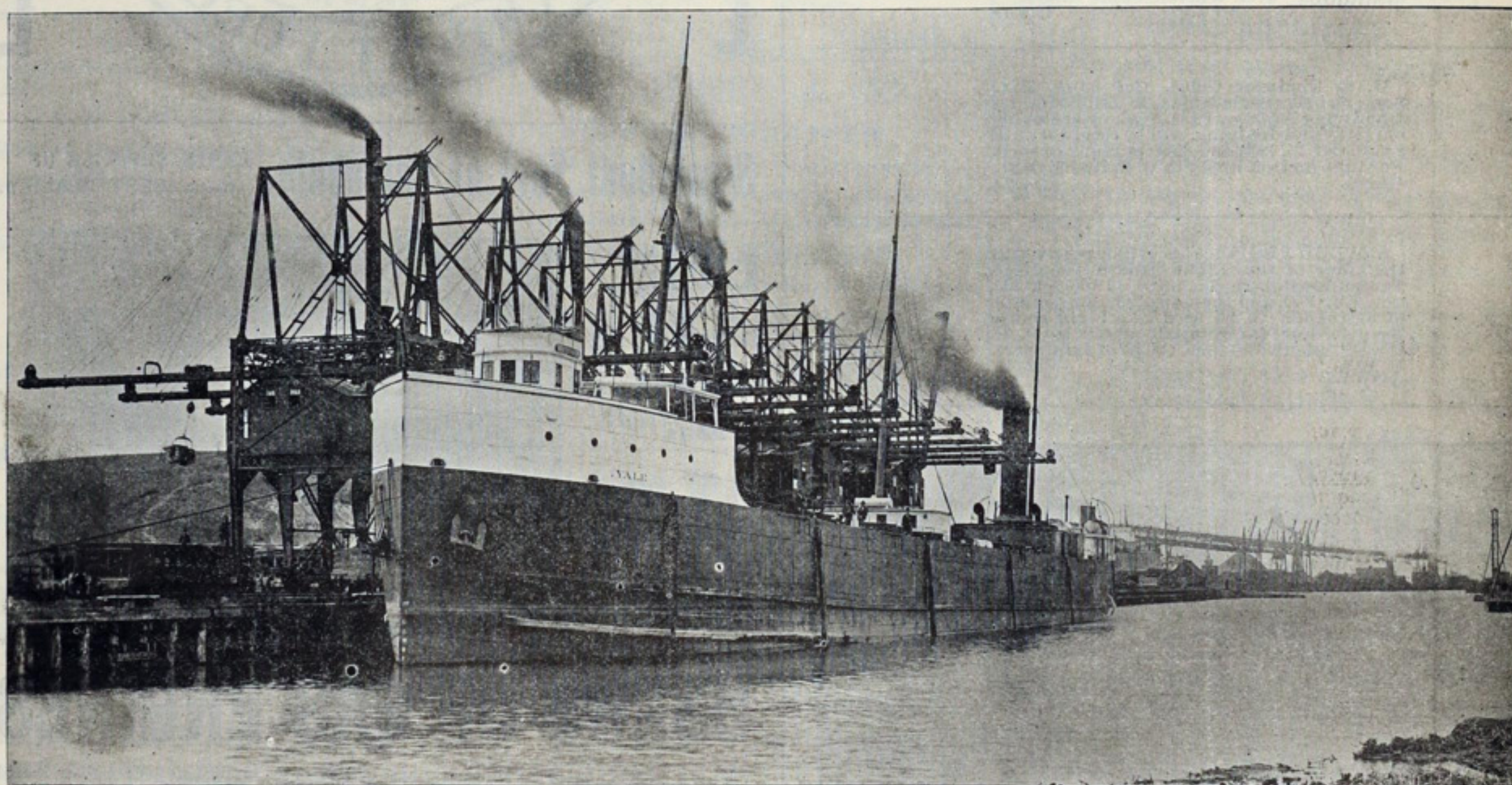
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